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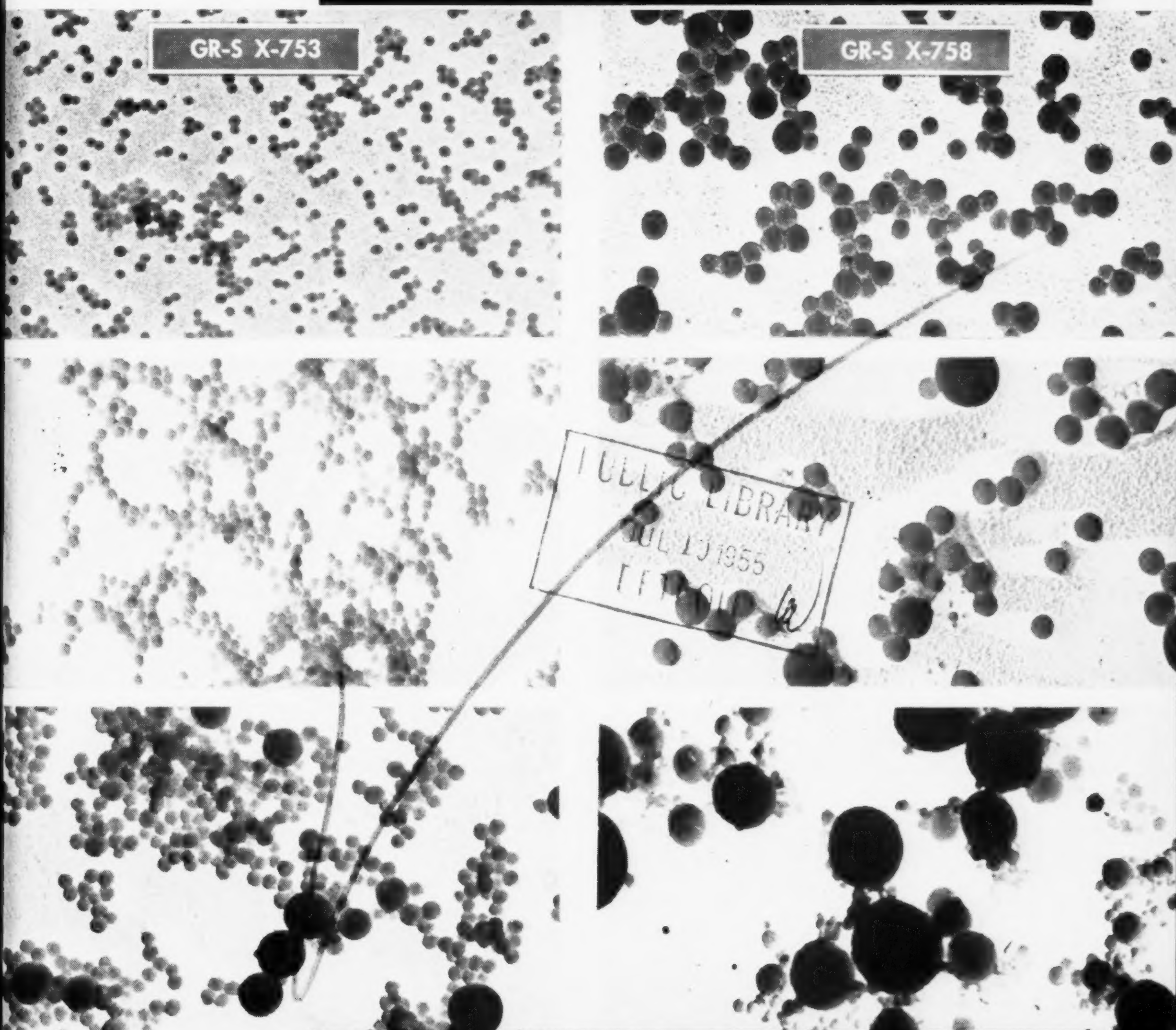

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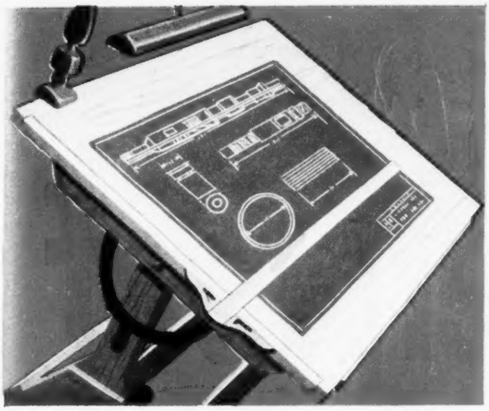
LTP GR-S LATEX PARTICLE
AGGLOMERATION AND GROWTH

see page 471

RUBBER WORLD, July, 1955, Vol. 132, No. 4. Published monthly by BILL BROTHERS PUBLISHING CORP. Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U.S.A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada, $6.00; All other countries $7.00; Single Copies 50 cents. Address Mail to N. Y. Office



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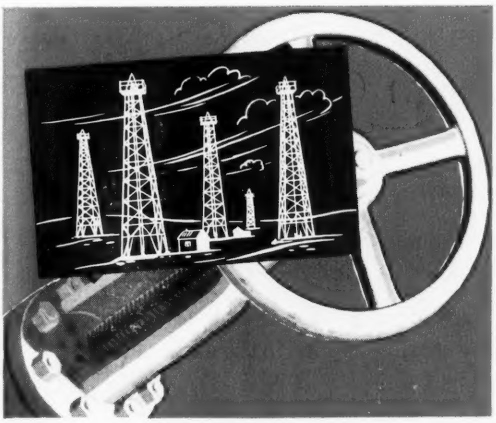

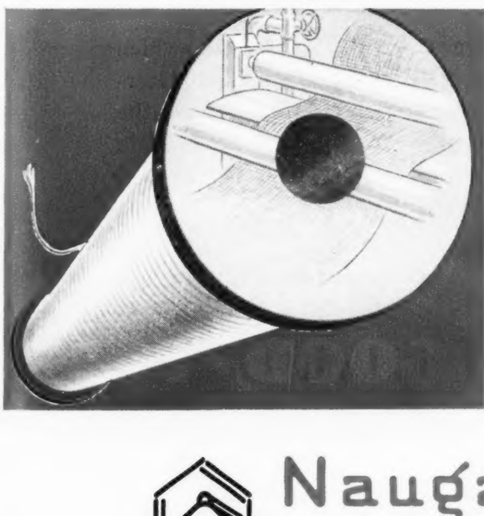

Paracril D is unexcelled in resistance to oils, fuels, aromatic hydrocarbons, chlorinated organic liquids, and many hydraulic fluids. It offers great dimensional stability, unusual tensile properties, high resilience, and exceptional abrasion resistance.

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As a raw polymer, Paracril D can be easily dissolved in many solvents to make low-viscosity adhesive solutions for cement applications.

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NOTE:
This advertisement originally appeared in leading newspapers on March 25, 1955. In effect, it is a statement of intent concerning the manufacture of PLIOFLEX — Goodyear Synthetic Rubber — and the PLIOLITE Latices. It is believed to be of sufficient importance to everyone concerned with the manufacture or use of rubber products to be reproduced here.

March 25, 1955

An announcement by GOODYEAR *of importance to every manufacturer of rubber products*

Today is a most significant one to the rubber industry, to all American industry and to the Nation at large.

Today Congress has approved private production of synthetic rubbers and latices — and Goodyear thereby will become owner and operator of former Government-owned plants in Houston, Texas, and Akron, Ohio.

Under Government sponsorship, synthetic rubber made hurried but great strides forward. In four short, war-clouded years, it grew from little more than a laboratory oddity into a vital factor in our national security and economy.

Goodyear played an important role in the development of this modern miracle and in laying the foundation upon which it was built.

Goodyear researchers began work in earnest on synthetic rubber in 1925. Our first patent was dated 1927. Before the war we were operating our own plant, producing rubber superior to any previously made. In 1942, we began operation of the first Government-owned plant.

Synthetic rubber quickly became a real and essential part of our military, industrial and personal lives.

Today synthetic rubber stands on the threshold of even greater progress.

Today a new and stimulating ingredient—free enterprise—is added.

Goodyear looks upon this new ingredient as both a responsibility and a challenge.

It is a responsibility in view of unsettled world conditions and their threat to the supply and price of natural rubber.

It is a challenge in that it provides the opportunity to prove again the advantages of private enterprise.

Here, in broad terms, is how we propose to meet these new obligations:

1. **Through full realization of the importance of a strong synthetic rubber industry to our over-all economy and security.**
2. **Through maintenance, modernization and expansion of current facilities to meet a growing demand for synthetics.**
3. **Through a continuous, concentrated research and development program with new and better rubbers and latices as its objective.**
4. **Through the sale of a sufficient portion of our production to ensure free and fair competition within the rubber industry.**
5. **Through a constant emphasis on service and quality in the sale of our products to any and all of our customers.**

Our immediate plans call for continuing the manufacture of the rubbers and latices in current production at Houston and Akron.

A number of improvements are already under way to provide our customers with rapid, continuous, reliable delivery and complete technical service.

This new venture into the manufacture of synthetic rubber may well be considered the opening of a new chapter in the history of the company and the industry. We fully intend to make it one of our proudest achievements.

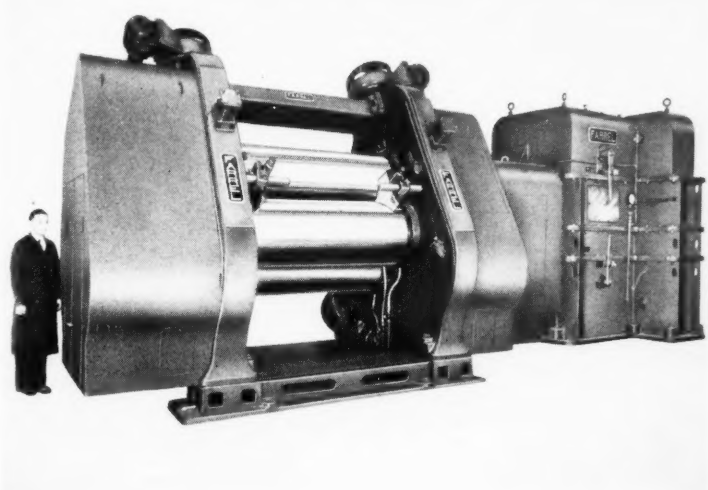
P. W. Litchfield

Chairman of the Board, THE GOODYEAR TIRE & RUBBER COMPANY

FOUR-ROLL "Z" CALENDER

A leading rubber company, in describing its new Farrel-Birmingham "Z" calender train for double-coating tire fabric, says that it "insures unmatched uniformity of quality". Ideal for high-speed production of film, sheet and coated fabrics, as well.

How to get maximum accuracy in calendering



THREE-ROLL TRI-ANGULAR CALENDER—The machine of the future for any type of production requiring high accuracy for two calendering passes. Right-angle arrangement of rolls provides closer control of gauge and easier feeding conditions.

F-B PRODUCTION UNITS

Banbury Mixers • Plasticators • Pelletizers • Extruders • Calenders • Mixing, Grinding, Warming and Sheeting Mills • Refiners • Crackers • Washers • Hose Machines • Bale Cutters • Hydraulic Presses and Other Equipment for Processing Rubber & Plastic Materials.

Recent and outstanding engineering contributions to the efficient conversion of raw material to finished product, are the Farrel-Birmingham four-roll "Z" calender and three-roll "Tri-angular" calender pictured here. These machines have established standards of calendering accuracy never before considered possible.

Among the refinements which contribute to this accuracy are motorized crossed-axes devices for fine adjustment of roll crown, and hydraulic pullbacks which hold the rolls in positive operating position.

When you bring your calendering problems to Farrel-Birmingham, you benefit from the experience and facilities that have gone into the development of machines like these. In fact, there's an excellent chance that the basic design for the "specialized" machine you require has already been worked out by Farrel-Birmingham engineers—and proved on the job.

Before you decide on a calender come to "calender headquarters". In the meantime, send for more information on the revolutionary "Z" and "Tri-angular" calenders.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Akron, Pittsburgh, Chicago, Fayetteville (N.C.), Los Angeles, Houston

Farrel-Birmingham

FB-1019

Bags, cures, de-bags in half the time with TIMKEN® bearings on eccentric shafts

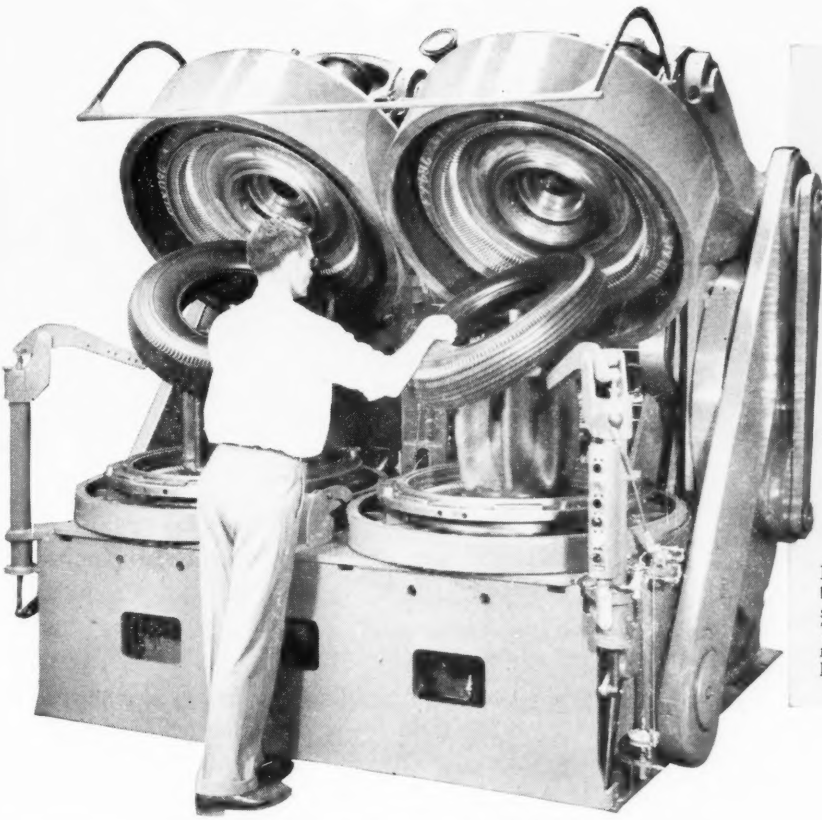
THIS new McNeil Bag-O-Matic Tire Press bags, cures and de-bags, does the work of three separate machines—and in half the time. To carry the heavy overhung load of the connecting link, McNeil mounts the eccentric shafts on Timken® tapered roller bearings.

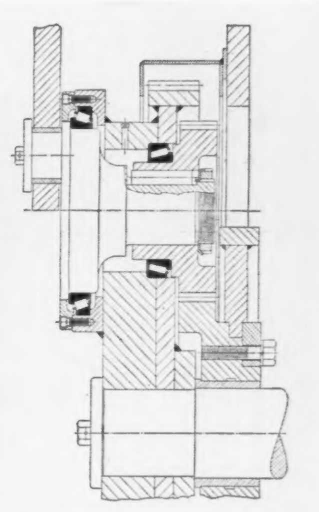
Line contact between the rollers and races of Timken bearings gives extra load-carrying capacity. And Timken bearings take both radial and thrust loads in any combination because of their tapered design. Eccentric shafts are held in positive alignment. Wear on moving parts is reduced. Maintenance costs are less, too.

There's less power loss in the McNeil Bag-O-Matic because the true rolling motion and extremely smooth surface finish of Timken bearings practically do away with friction. And the steel in Timken bearings is the highest quality ever developed for tapered roller bearings—Timken fine alloy steel. The Timken Company is the only bearing maker in the U. S. A. that makes its own steel.

Get long life and dependable performance in the rubber machinery you build or buy. Insist on Timken bearings. Look for the "Timken" trade-mark on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.





How **McNEIL MACHINE AND ENGINEERING CO.** mounts eccentric shafts of its Twin Bag-O-Matic Tire Press on Timken tapered roller bearings to carry overhung loads.

OUR OWN NICKEL-RICH ALLOY STEEL MAKES TIMKEN BEARINGS TOUGHER

Nickel makes steel tougher. And we don't skimp on nickel in the fine alloy steel we make for Timken bearings. Our steel-making specialists use the exact amount to give Timken bearings the toughness they need to withstand shock, last longer. We control the quality of Timken bearings at every step in production—from melt shop through final bearing inspection.

TIMKEN

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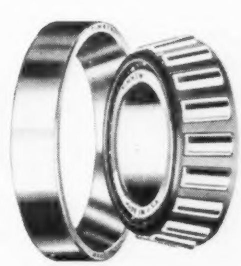
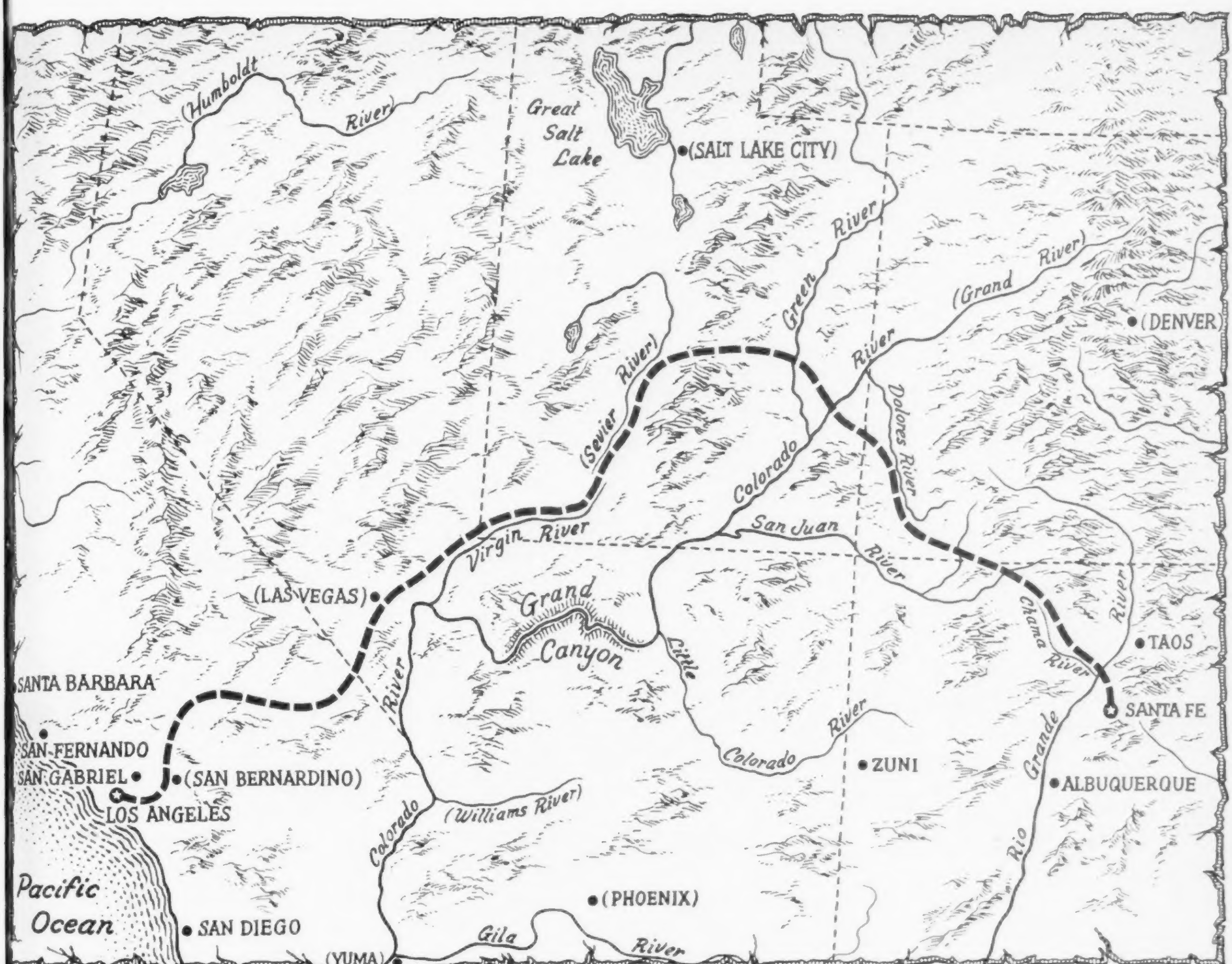
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



One of a series on transportation and famous trails.

The Old Spanish Trail

On July 29, 1776, Fray Escalante and Fray Dominguez ccompanied by eight soldiers left Santa Fe in an endeavor o open up direct lines of communication between Santa Fe nd Monterey, California. Proceeding northwest up the hama River, they crossed the Colorado and the Green rivers, roceeded to a point near what is now Provo, Utah. Turning the southwest, they were blocked from further westward avel by the heavy snows in the mountains, got back to anta Fe January 3, 1777.

In the early 1830's, Ewing Young and a company of trapers, one of whom was probably Kit Carson, made a fur-hunt- tour of the western valleys. Other trappers and traders uickly followed, taking the trail through Taos, cutting off the d Escalante-Dominguez trail at a point on the Green River. here developed from these journeys a brisk trade between anta Fe and California, mainly confined to the exchange of ew Mexican blankets and woven materials for the mules d horses of California.

Thus was joined in the southwest the trails which converged on Santa Fe — one which came from the east, another from El Paso and Chihuahua. Another link was forged connecting the Atlantic with the Pacific.

How far man has come in his ability to transport himself and the products of his handiwork. Modern highways today crisscross the trails which the explorers, the trappers and traders made from Santa Fe to the west coast. What a miracle it would seem to any of those valiant men to see the products of California's farm and factory in eastern, southern and midwestern cities in a few score hours after leaving the Sunshine State. The rubber tire has speeded man's ability to progress. Dependably and swiftly, it takes man anywhere he wishes to go. Today's rubber tire has longevity and durability, characteristics which are imparted by carbon black. UNITED BLACKS, constantly improved and perfected as a service to the rubber industry, provide the durability and strength which give tires their long-wearing characteristics.

UNITED CARBON COMPANY, INC.

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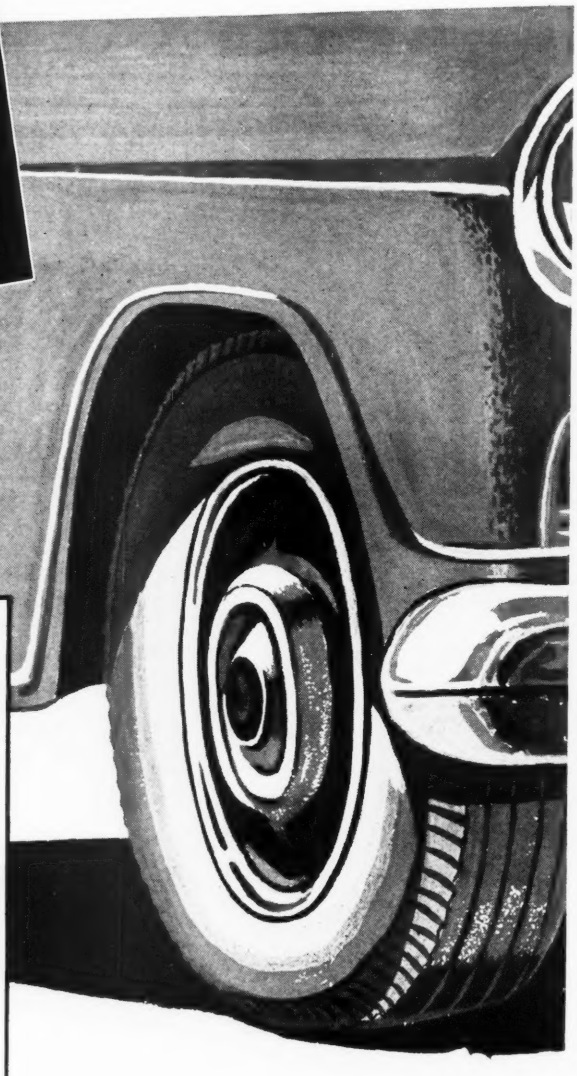

USE PEQUANOC *Champion* RECLAIM

To produce long wearing tire treads and camelback at an economical price, we recommend Champion reclaim.

A typical formula which meets Federal Specification ZZ-T-416a follows:

COMPOUND A-418-5

GR-S 1601	74.72
PEQUANOC CHAMPION	**13.46**
Zinc Oxide	1.70
PBNA	0.57
Stearic Acid	0.86
Light Process Oil	3.43
MR	3.43
Sulfenamide Accelerator	0.70
Sulfur	1.13
	100.00

	A-418-5	Specification ZZT-416A
Estimated Pound Cost	\$0.1900	——
Specific Gravity	1.155	1.175 Max.
Estimated Volume Cost	\$0.2195	——

PHYSICAL PROPERTIES

Press Cured 60 min @ 260°F.

Tensile (psi)	2200	2000 Min.
Elongation (%)	520	450 Min.
Modulus @ 300% (psi)	850	700 Min.

Pequanoc Rubber Co.

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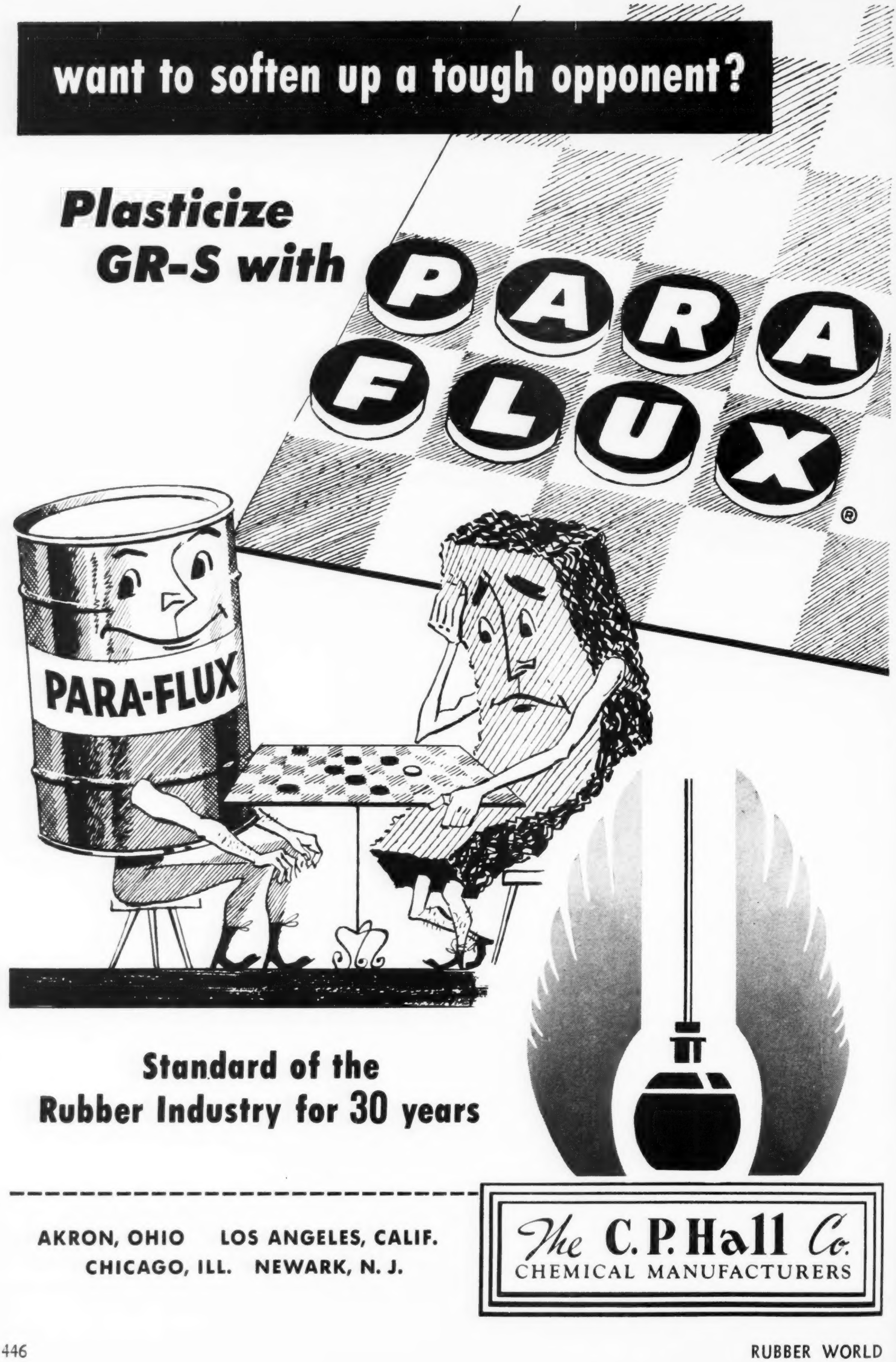
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Standard of the Rubber Industry for 30 years
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DUREZ RESINS IN GRS

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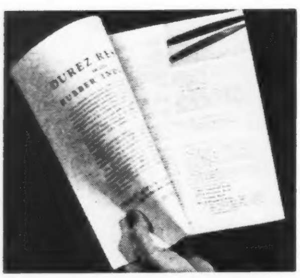

When you increase abrasion resistance in shoe sole stocks by incorporating Durez phenolic resins with GRS, you give people longer wear for their money — build up brand acceptance — broaden your market for these compounds.

For shoe soles and other GRS applications such as top lifts, Durez resins bring other important advantages. Although used in small amounts, they serve as effective plasticizers during processing. They also contribute strongly to stiffness or boardness, and produce a Shore A hardness of 90 to 100. These properties are retained at elevated temperatures due to the thermosetting nature of the resins.

Even greater effectiveness of the Durez resin can be obtained with GRS stocks by using small amounts of nitrile rubber. The nitrile acts as a common solvent or flux and greatly increases compatability of the resin.

OUR LATEST BULLETIN on resins in the rubber industry contains technical information, practical suggestions, and formulae. Stocks of many types are covered — as well as solvent cements and latices. Ask for a copy today.

DUREZ PLASTICS DIVISION
HOOKER ELECTROCHEMICAL COMPANY
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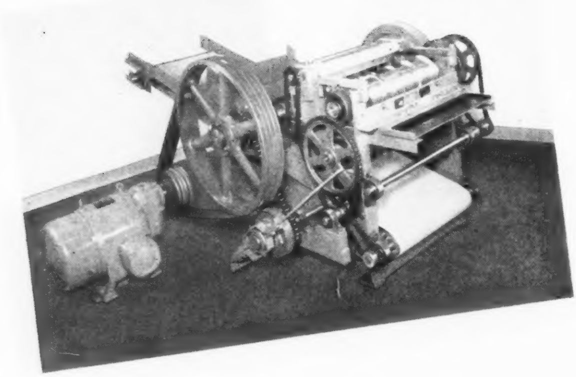

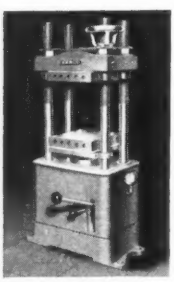

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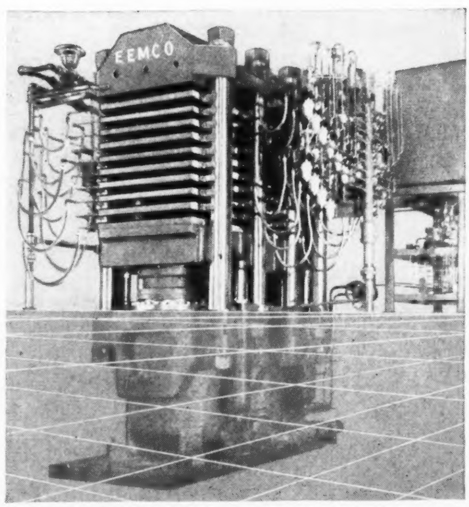

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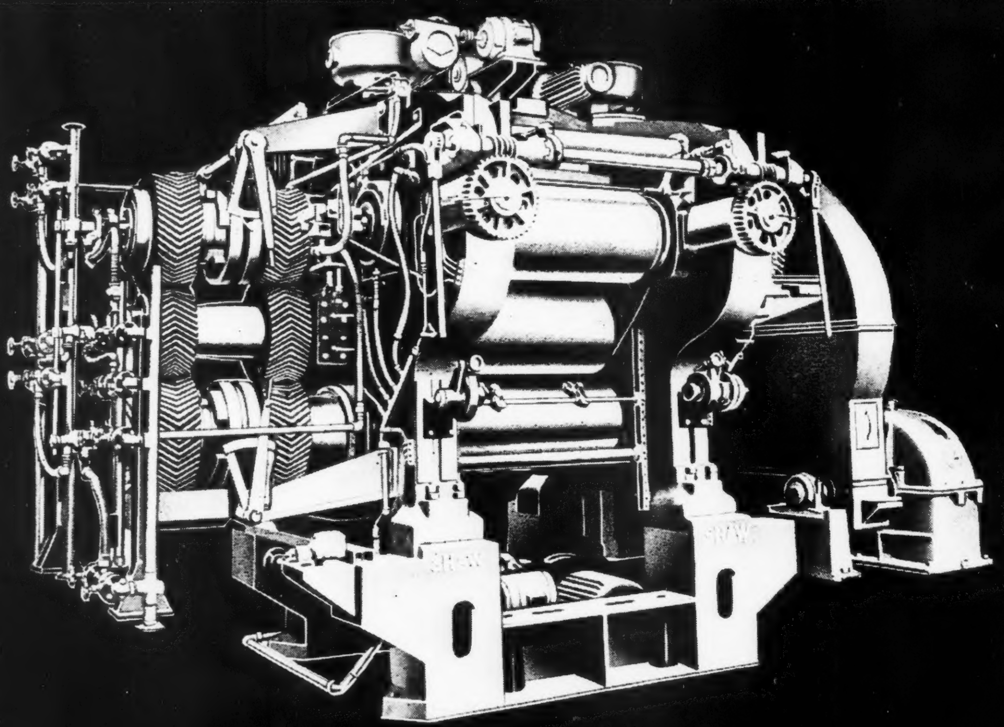

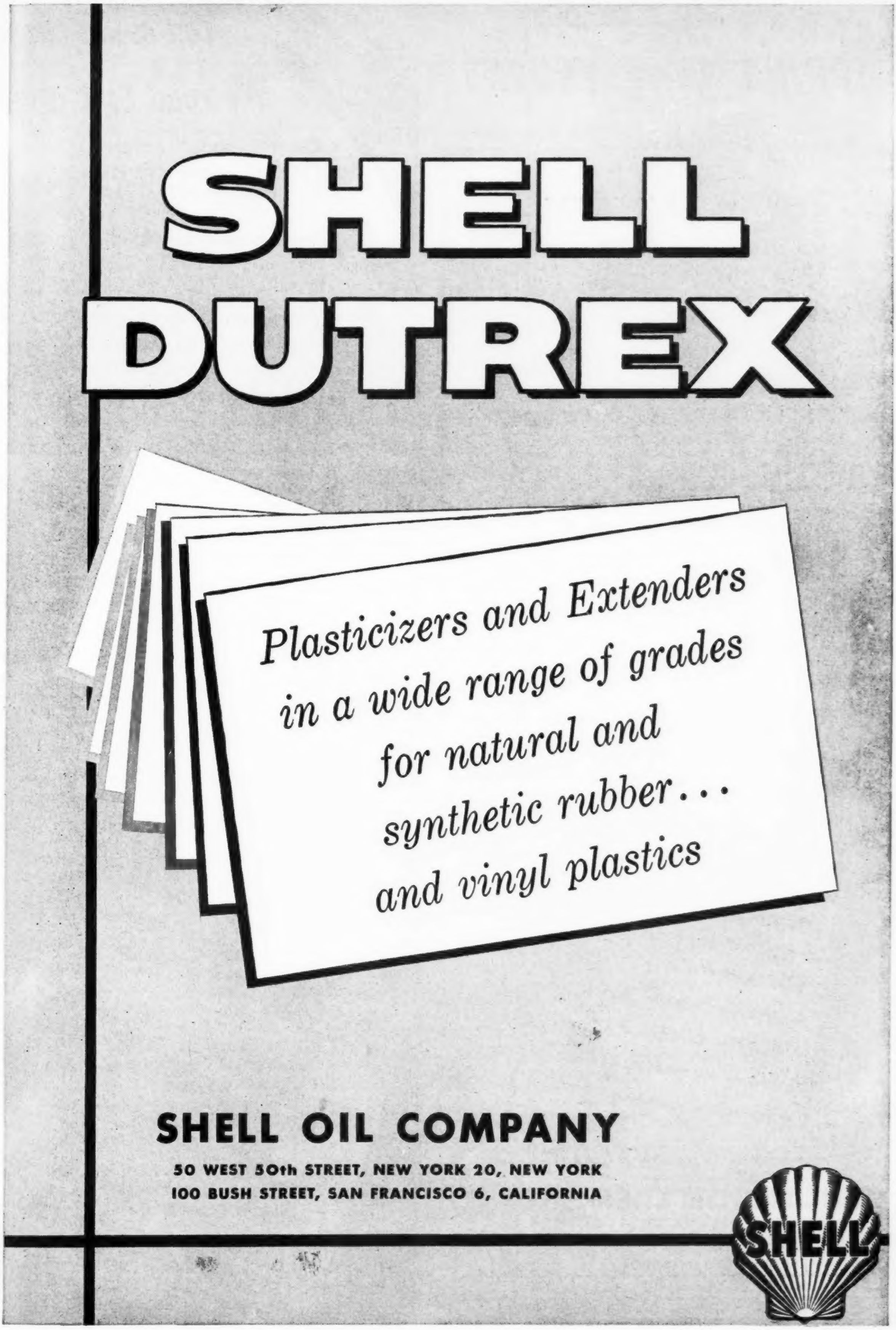
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VOLUME 132 • NUMBER 4 • JULY, 1955

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Cover photograph, courtesy of Naugatuck Chemical, Division of United States Rubber Co.

RUBBER WORLD

JULY, 1955

Growth and Agglomeration of Particles in Low-Temperature GR-S Type of Latex[1]

By R. W. BROWN and L. H. HOWLAND

United States Rubber Co., Naugatuck Chemical Division, Naugatuck, Conn.

High solids latex may be prepared by polymerizing to an intermediate solids content and particle size, followed by solvent agglomeration and concentration.

Somewhat similar agglomeration normally takes place at intermediate conversions in conventional high solids latex recipes, although the polymerization rate after such agglomeration is slowed down owing to the reduced number of particles present.

The ratio of hydrocarbon to water is very important in determining the extent of agglomeration both during and after polymerization.

PREVIOUS developments in low-temperature polymerization of GR-S latices at this laboratory have been published.[2-5] This paper describes studies on the agglomeration of latex particles during and after polymerization.

Agglomeration of Finished Latex

Medium and low solids latex recipes are characterized by faster and more uniform polymerization rates than are comparable high solids recipes and consequently give greater productivity in plant operation. Methods of agglomerating the resulting small particle-size latices sufficiently to allow concentration to 50-60+% solids are therefore of interest, and several methods have been described.[6-13] In addition, we have found that treatment of the latex with relatively large volumes of a solvent for the contained polymer causes smooth agglomeration.

TABLE 1. AGGLOMERATION OF A MEDIUM SOLIDS LATEX WITH BENZENE

	Original	Agglomerated
% Solids	49.4	49.5
Viscosity, cps.	780	35
Optical density* at 7000 A. U.	0.21	2.4
Average particle diameter, A. U.†	1000	3000
Relative number of particles/unit weight‡	100	4
Surface tension, dynes/cm.	60.5	34.5
pH	9.2	9.7

*The relation between optical density and particle size has been described by S. H. Maron in a private communication to the Federal Facilities Corp., Office of Synthetic Rubber.

†Unless otherwise stated, all particle sizes were estimated from optical density measurements at 7000 A. U. wavelength.

‡Calculated from average particle size.

[1]Presented before the Rubber Division, Chemical Institute of Canada, Niagara Falls, Ont., Canada, May 20, 1955.

[2]R. W. Brown, C. V. Bawn, E. B. Hansen, L. H. Howland, *Ind. Eng. Chem.*, 46, 1073 (1954).

[3]L. H. Howland, V. C. Neklutin, R. W. Brown, H. G. Werner, *Ibid.*, 44, 762 (1952).

[4]H. S. Smith, H. G. Werner, J. C. Madigan, L. H. Howland, *Ibid.*, 41, 1584 (1949).

[5]H. S. Smith, H. G. Werner, C. B. Westerhof, L. H. Howland, *Ibid.*, 43, 212 (1951).

[6]United States patent Nos. 2,444,801 (1948) and 2,462,591 (1949)—E. Arundale, assigned to Standard Oil Co. of N. J.

[7]U. S. patent No. 2,446,101 (1948)—C. R. Peaker, to U. S. Rubber Co.

[8]U. S. patent Nos. 2,481,876 (1949) and 2,538,273 (1951)—C. E. Rhines, to U. S. Rubber.

[9]C. E. Rhines, J. McGavack, *Rubber Age (N. Y.)*, 63, 599 (1948).

[10]U. S. patent Nos. 2,467,053, 2,475,053, and 2,484,425 (all in 1949)—J. S. Rumbold, to U. S. Rubber.

[11]E. Schmidt, R. H. Kelsey, *Ind. Eng. Chem.*, 43, 406 (1951).

[12]U. S. patent No. 2,446,115 (1948)—E. C. Svendsen, to U. S. Rubber.

[13]U. S. patent Nos. 2,357,861 (1944) and 2,444,689 (1948)—E. A. Willson, to B. F. Goodrich Co.

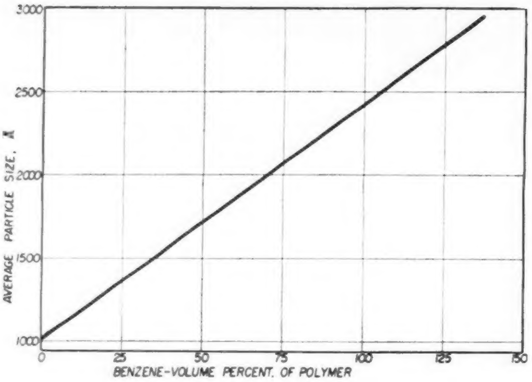

Fig. 1. Effect of benzene on particle size of 50% GR-S type of latex

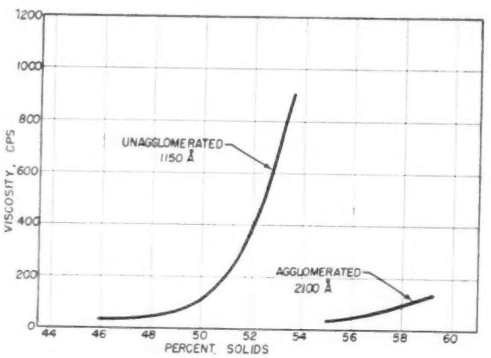

Fig. 2. Viscosity of agglomerated and unagglomerated latices

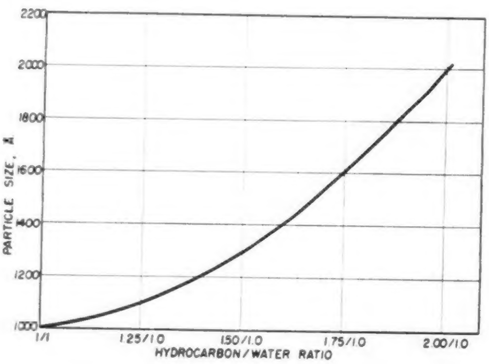

Fig. 3. Effect of hydrocarbon/water ratio on agglomeration of medium solids latex

Table 1 shows properties of a medium solids GR-S latex (J-6083) before and after agglomeration with 80% of its volume of benzene. The benzene was removed by steam distillation and the latex reconcentrated before testing. The polymerization recipes for this and other experimental latices are in Table 2.

TABLE 2. POLYMERIZATION RECIPES FOR EXPERIMENTAL LATICES

	J-6083	J-6475 (X-753 Type)	J-6477 (X-758 Type)
Butadiene	50	86	70
Styrene	50	14	30
Water (total)	140	69	65
DIBH*	0.1	0.1	0.1
SFS†	0.1	0.15	0.05
$FeSO_4 \cdot 7H_2O$	0.003	0.002	0.003
EDTA‡	0.012	0.004	0.006
Potassium soap of disproportionated rosin acid	5.0	..	1.3
Potassium oleate	..	1.85**	1.7††
Dispersing agent§	..	0.74**	1.5
K_2SO_4	..	..	1.2
$Na_3PO_4 \cdot 12H_2O$	..	0.26**	..
KCl	1.0	..	..
Sulfole¶	0.4	0.07	0.05
Shortstop, KDMDTC‖	0.2	0.2	0.2
% Conversion	85	37	60
Reaction time, hours	37	14	57
Polymerization temp., °C.	5	5	5

*Diisopropyl benzene hydroperoxide.
†Sodium formaldehyde sulfoxylate dihydrate.
‡Ethylene diamine tetra-acetic acid, tetrasodium salt.
§Sodium salt of condensed naphthalene sulfonic acids.
¶Tert-dodecyl mercaptan.
‖Potassium dimethyl dithiocarbamate.
**Added in increments, 65% at start and 35% at 18% solids.
††Added in increments, 59% at start and 41% at 25% solids.

TABLE 3. AGGLOMERATION OF A MEDIUM SOLIDS LATEX WITH VARYING AMOUNTS OF BENZENE

Latex, ml. (50% solids)	100	100	100	100	100	100
Benzene, ml.	..	12.5	25.0	37.5	50.0	75.0
% of polymer	..	25	50	75	100	150
Hydrocarbon*/H_2O ratio	1.0	1.2	1.5	1.8	2.0	2.5
Optical density	0.25	0.46	0.88	1.02	1.92	2.16
Average particle diameter, A. U.	1000	1300	1850	1950	2650	2800
Relative number of particles/unit weight†	100	45	16	13	5	4

*Polymer plus benzene.
†Estimated from particle size.

Several other water insoluble organic solvents were also tried as agglomerating agents. In general, the hydrocarbons and their halogen derivatives were found to give smooth agglomeration; while more polar compounds such as diisobutyl carbinol and nonyl phenol caused excessive coagulum. It appears that the effective agglom-

TABLE 4. AGGLOMERATION OF A MEDIUM SOLIDS LATEX WITH VARYING AMOUNTS OF ISOPRENE

Isoprene, volume % of polymer	0	25	50	75	100	125	150
Hydrocarbon*/H_2O ratio	0.8	1.0	1.2	1.4	1.6	1.8	2.0
Optical density	0.35	0.37	0.39	0.49	0.63	0.88	1.15
Average particle diameter, A. U.	1150	1200	1250	1400	1550	1800	2100
Relative number of particles/unit weight†	100	88	77	55	41	26	16

*Polymer plus isoprene.
†Approximated from particle size.

erating agents are those which act as solvents or swelling agents for the contained polymer. This point was confirmed by flocculating samples of the polymer and immersing them into the various solvents. Solvents which gave smooth agglomeration dissolved the polymer or caused several hundred per cent. swelling. Further confirmation of the relation between swelling and agglomeration was obtained by use of a cross-linking agent. A latex was prepared with 5% divinyl benzene in the monomers to give insoluble polymer. Treatment of this material with benzene caused 30 to 60% of the polymer to appear as coagulum. Normally the amount of coagulum does not exceed 1%.

Differences in appearance of the latex during agglomeration are noticeable when solvents or non-solvents for the polymer are used. Solvents cause a progressive thickening or even gelation, usually followed by some thinning as agglomeration occurs. When a non-solvent is added, the latex remains fluid, and small particles of coagulum soon appear.

Effect of Varying Amounts of Solvent

In order to determine the amounts of solvent necessary for agglomeration, benzene was added in increments to a medium solids latex similar to J-6083 at 50% solids. A small sample was removed after each increment, and the particle size measured. Table 3 shows that an amount of solvent equivalent to 50-75% of the volume of the polymer was necessary to increase the particle size to the range necessary for high solids latex. In Figure 1 the particle size is shown as a function of the amount of benzene added.

Since practical application of this method of agglomeration in a synthetic rubber plant would probably involve the use of butadiene as the solvent, it appeared desirable to carry out an agglomeration with it or a related compound. Isoprene was substituted for butadiene because of its comparative ease of handling. Table 4 shows the results of agglomerating a medium solids latex at 45% solids with increments of isoprene.

A comparison of the data of Tables 3 and 4 indicates that benzene is a somewhat more efficient agglomerating agent than isoprene on an equal volume basis. Some of this difference, however, is due to the difference in solids content of the latices, a variable to be discussed in the following section.

The relative numbers of particles shown in Tables 3 and 4 are only an approximation, but were calculated to emphasize the very large decrease in particle number which is brought about by agglomeration. Figure 2 shows a comparison of viscosity characteristics of agglomerated and unagglomerated samples (original and final latices of Table 4). It is apparent that the agglomerated sample has good viscosity characteristics in the 60% solids range.

Effect of Hydrocarbon/Water Ratio

The first work was carried out without much regard for the hydrocarbon/water ratio. If the latex became jelled, additional water was added to aid in agitation. Variable results led to a study of the effect of this ratio. Table 5 and Figure 3 show the results of agglomerating

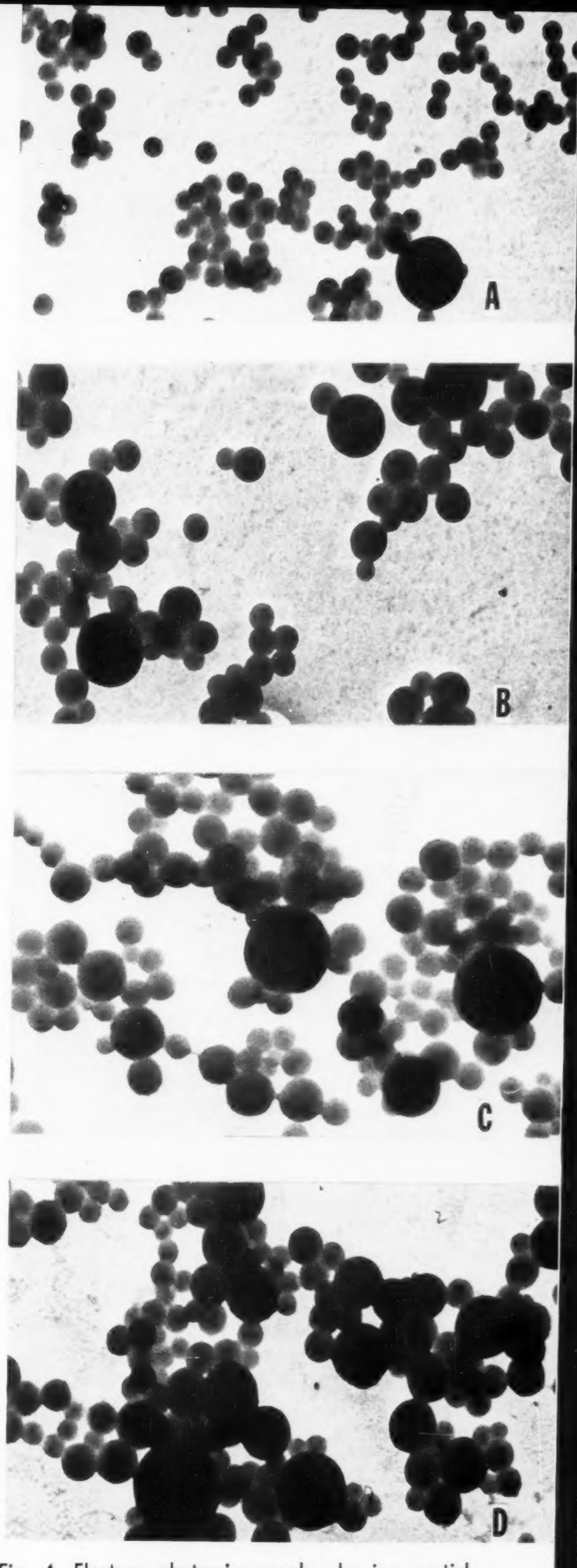

Fig. 4. Electron photomicrographs showing particle growth during solvent agglomeration of medium solids latex (magnification, 48,000 times). A—0% benzene; B—50% benzene; C—75% and D—150% benzene

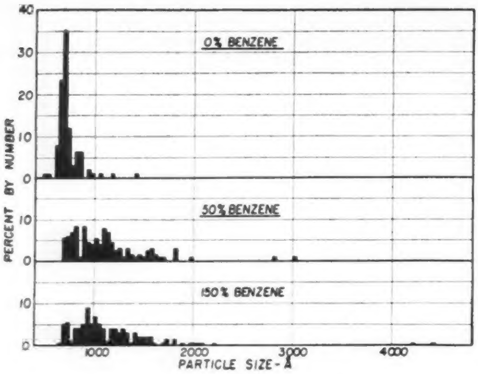

Fig. 5. Number average particle size distribution of solvent agglomerated latices compared with control with solvent

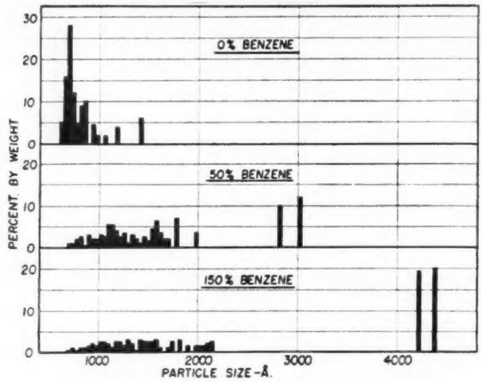

Fig. 6. Weight average particle size distribution of solvent agglomerated latices compared with control

TABLE 5. AGGLOMERATION WITH BENZENE AT VARYING HYDROCARBON/WATER LEVELS

Latex (50% solids), ml.	200	200	200	200	Control*
Benzene, ml.	100	100	100	100	..
Added H_2O, ml.	..	14	33	60	..
Hydrocarbon†/H_2O ratio‡	2/1	1.75/1	1.50/1	1.25/1	..
Optical density	1.13	0.64	0.42	0.31	0.25
Average particle size, A. U.	2000	1600	1300	1100	1000
Surface tension (dynes/cm.)	46	57	62	..	64

*Untreated base latex.
†Polymer plus benzene.
‡Volume ratios.

TABLE 6. AGGLOMERATION WITH VARYING AMOUNTS OF BENZENE AT A CONSTANT HYDROCARBON/WATER RATIO

Latex (50% solids), ml.	200	200	200
H_2O, ml.	..	12.5	25
Benzene, ml.	100	125	150
Optical density	1.42	1.85	1.98
Average particle diameter, A. U.	2300	2600	2700

TABLE 7. EFFECT OF DISPERSING AGENT ON SOLVENT AGGLOMERATION

Latex (50% solids), ml.	200	200	Control*
Benzene, ml.	100	100	..
Dispersing agent†	..	2.0	..
Optical density	2.17	2.10	0.25
Particle size, A. U.	2850	2800	1000
Concentrated solids, %	62.7	67.5	51.0
Viscosity, cps. (Brookfield)	340	1200	1680

*Untreated base latex.
†Sodium salt of condensed naphthalene sulfonic acids.

a medium water latex with a constant volume of latex and benzene, but with the addition of varying amounts of water.

It is apparent that the hydrocarbon/water ratio exerts a large effect on the amount of agglomeration. To confirm these data another series of runs was made in which the latex was diluted with water, but the hydrocarbon/water ratio was maintained constant at a 2/1 ratio by increasing the amount of benzene added. Table 6 shows that under these conditions the amount of agglomeration increased somewhat, presumably owing to the higher hydrocarbon/soap ratio.

Effect of Temperature

In order to determine the effect of temperature on the extent of agglomeration, experiments were carried out in which a medium solids latex was agglomerated at 50% solids with toluene (100 volume % of latex solids) at 2, 50, and 80° C. Final particle sizes were 2600, 2700, and 2750 A. U., respectively, indicating that temperature has only a slight effect on the extent of agglomeration.

In other runs with benzene as the agglomerant at 26 and 50° C. in which samples were taken at various time intervals, the rate of agglomeration was found to be somewhat faster at the higher temperature. The process is rapid at either temperature, being essentially complete in 40 minutes at 25° C. and 20 minutes at 50° C.

Effect of Soap and Dispersing Agent

In order to determine whether additional soap would prevent solvent agglomeration, a 1000 Angstrom[14] latex containing five parts of soap per hundred of polymer was agglomerated with benzene after addition of three parts of disproportionated rosin soap. The final particle size was 2200 A. U., as compared to 2500 A. U. for a control latex agglomerated with no added soap. Apparently additional emulsifier has only a moderate effect on this type of agglomeration.

Addition of a condensed naphthalene sulfonate dispersing agent before agglomeration appeared to have little or no effect on agglomeration, but decreased viscosity both during and after treatment. Table 7 shows agglomeration with and without added dispersing agent.

Changes in Particle Size Distribution

In order to determine the effect of agglomeration on particle size distribution, electron photomicrographs were taken of the agglomerated samples described in Table 3. Figure 4 shows sections from some of these photomicrographs, and in Figures 5 and 6 the number and weight distribution for three of the samples are shown. It should be emphasized that, because of the very large mass of the largest particles and their infrequent

[14]To convert Angstrom units to microns multiply by 0.0001.

TABLE 8. PARTICLE GROWTH IN J-6475 (X-753 TYPE) LATEX

Hours of polymerization	5.25	10.25	14.0	14.0	14.0	14.0	14.0
After shortstop	..	..	..	5	15	25	70
% Conversion	12.5	26.5	37.0	37.0	37.0	37.0	37.0
Optical density	0.03	0.032	0.51	0.57	0.63	0.71	0.84
Average particle size, A. U.	400	400	1400	1480	1550	1650	1800
Relative number of particles	(470)	1000	33	26	24	20	15
% Solids at 1000 cps. viscosity	..	..	54.8	..	..	55.8	57.6

TABLE 9. PARTICLE GROWTH IN J-6477 (X-758 TYPE) LATEX RECIPE

Hours of polymerization	3.25	6.25	16.0	29.0	35.0*	44.0	57.0
% Conversion	3	12	20	28	36	45	60
Optical density	0.14	0.16	0.61	1.75	1.93	1.35	1.23
Average particle size, A. U.	720	770	1500	2550	2650	2250	2150
Minimum particle size†, A. U.	300	400	700	400	..	700	900

*Stabilizer added.
†From electron photomicrographs.

occurrence as compared to the small ones, it is impossible to obtain a smooth distribution curve from these photographs except by counting a prohibitively large number of particles. It is also very difficult to get a good value for the weight per cent. represented by the large particles, although the relative numbers can be determined quite accurately.

The photomicrographs, however, do show that in the original latex the majority of particles (about 80%) were in the range of 600 to 800 A. U. As agglomeration proceeded, the particles appear to have merged randomly with a consequent wide distribution in which no particular size predominated. Even in the most extensively agglomerated sample, there were still appreciable numbers of 700 to 800 Angstrom particles, although their contribution to the total weight had become negligible. The very large relative amount of weight represented by two particles in each of the agglomerated samples (Figure 6) emphasizes the difficulties referred to earlier.

Agglomeration during Polymerization of High Solids Latex

Particle Growth as a Function of Conversion

A consideration of the conditions during agglomeration of these medium solids latices shows that they are quite similar to those existing at intermediate conversions of high solids latex recipes. For example, a system containing 100 parts of latex at 50% solids agglomerated with 50% of its weight of benzene (50 parts water, 50 parts polymer, 50 parts benzene) is very similar to a high solids latex at 50% conversion (50 parts water, 50 parts polymer, 50 parts monomers). It therefore appeared that extensive solvent agglomeration must go on during polymerization. To check this assumption a 20-gallon pilot-plant batch of X-753 type of latex (J-6475) was prepared and sampled at various conversions. Since at the time this work was done it appeared that the agglomeration might be occurring over a relatively long period of time, the batch was not completed, but shortstopped at 37% conversion and held in the reactor for an additional 70 hours. Data are collected in Table 8. The polymerization recipe is shown in Table 2.

It is apparent that in the initial stages of polymerization this latex contained far too many particles for a high solids latex. Calculation shows that a latex with an average particle size of 400 A. U. at 26% conversion, which increases in particle size only by uniform growth of particles already present, will have an average particle size of only 530 A. U. at 60% conversion ($400 \times \sqrt[3]{60/26}$). The abrupt increase in particle size between 26 and 37% conversion must be attributed to some other factor, apparently solvent agglomeration caused by unreacted monomers dissolving in the latex particles. This agglomeration also can explain the typical decrease in polymerization rate normally found in high solids latex recipes between 20 and 30% conversion. The relative number of particles given in Table 8 shows that only about 3% of the initial number was left after agglomeration. This figure is an approximation, but it obviously is small enough to have a severe effect on polymerization rate if an approximation of the theory[15,16] that polymerization rate per particle is constant in emulsion polymerization holds in these recipes.

Electron photomicrographs of the first three and the final samples of Table 8 are reproduced in Figure 7. The photomicrographs correlate well with the data discussed above. The first two samples (12.5 and 26.5% conversion) show a small particle size, nearly monodisperse latex; while the 37% conversion sample has many large particles, although the minimum particle size increases about as would be expected from the per cent. conversion. (A measured ratio of average diameters of the smallest particles in the three micrographs of 1.0/2.1/3.3 was obtained compared to a calculated ratio of 1.0/2.2/3.0.) Had polymerization been allowed to continue, of course, the smaller particles would have grown faster than would be calculated from the conversion increase, owing to the bulk of relatively inactive large particles. The final micrograph, taken after 70 hours' aging, shows no change in size of the basic particles, and, as would be expected from the random scattering of large particles, appears visually like the third sample, taken before aging, although the average particle size has increased considerably.

Viscosity *vs.* solids curves (Figure 8) show a slow progressive improvement on aging in the reactor, correlating with the increased particle size found by turbidity measurement. The magnitude of this slow growth is

[15]W. V. Smith, *J. Am. Chem. Soc.*, 70, 3695 (1948).
[16]W. V. Smith, R. H. Ewart, *J. Chem. Phys.*, 16, 592 (1948).

small, however, compared to the rapid initial agglomeration.

Another pilot-plant batch, J-6477 (GR-S 2105 type) was sampled and studied at various conversions up to 60%. Data are collected in Table 9. The polymerization recipe is shown in Table 2.

In this latex, agglomeration started much earlier and was more extensive than was the case with J-6475. Another unexpected result was the decrease in average particle size between 36 and 45% conversion. An examination of the electron photomicrographs (Figure 9) shows that an extensive group of new particles was formed as early as 28% conversion and was apparently responsible for decreasing the average particle size.

The formation of new particles in X-758 (GR-S 2105) latex after stabilizer addition has been reported previously,[17] but in this case agglomeration appeared to proceed so far that free soap was released and new particles were started before the stabilizer was added at 36% conversion. Reaction rate characteristics of this recipe are also such as to correlate with new particle formation. Batches which have become very slow in polymerization rate in the range of 25 to 35% conversion can often be accelerated to polymerization rates nearly as rapid as the initial rate after addition of stabilizer soap. Apparently the increase in rate is due primarily to polymerization in new particles.

Effect of Hydrocarbon/Water Ratio on Agglomeration during Polymerization

From the work which has been done previously on solvent agglomeration and from the development of higher solids latex in general, it was apparent that the hydrocarbon/water ratio during polymerization has a great effect on the final latex particle size. In order to determine this effect more precisely, a series of bottle-scale polymerizations was carried out in a recipe similar to that for X-753 except that no stabilizers were added during polymerization. The amount of monomer was reduced stepwise from 100 to 6.25 parts, thereby decreasing the volume ratio of the hydrocarbon to water phase from 2.9 to 0.2. Table 10 shows results. It is apparent that this variation in volume ratio of the hydrocarbon and water phases has caused a great change in average particle size of the resulting latices.

A usable high solids latex should have a viscosity in

[17]L. H. Howland, W. E. Messer, private communication to Federal Facilities Corp., OSR.

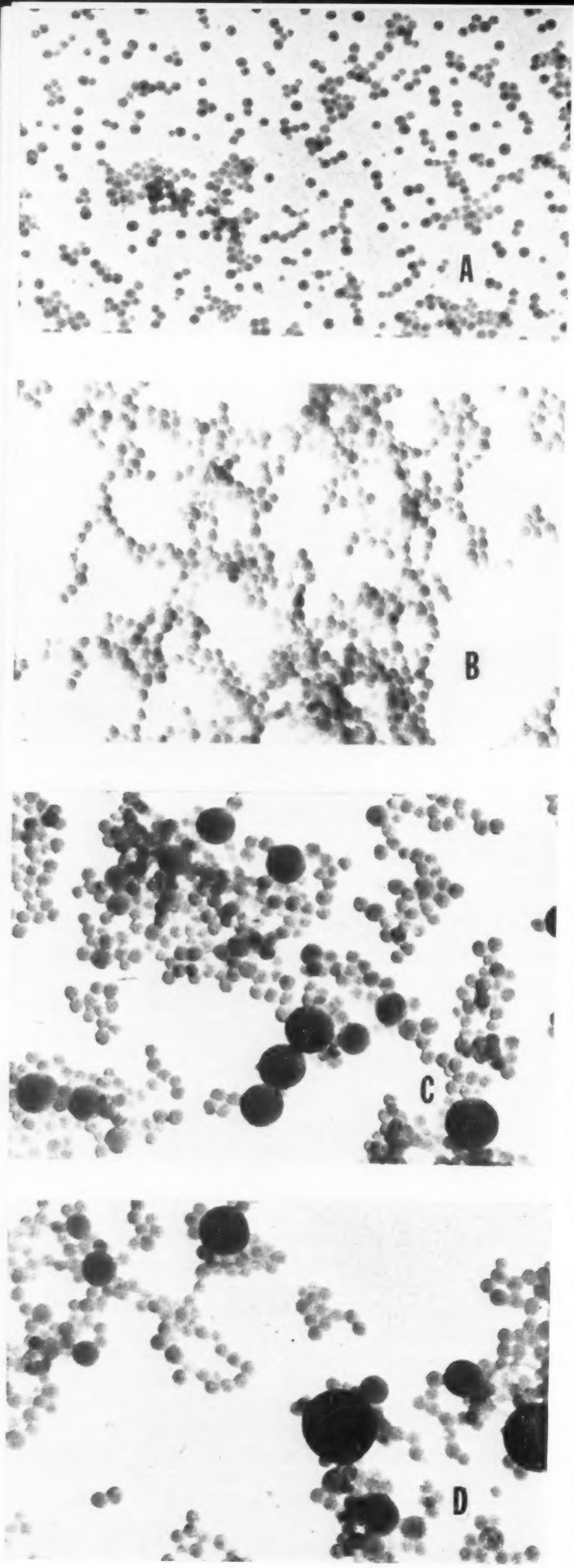

Fig. 7. Particle growth of X-753, high solids, GR-S type of latex during polymerization (magnification, 48,000 times). A—12.5% conversion; B—26.5% conversion; C—37% conversion; D—37% conversion—70 hours' aging

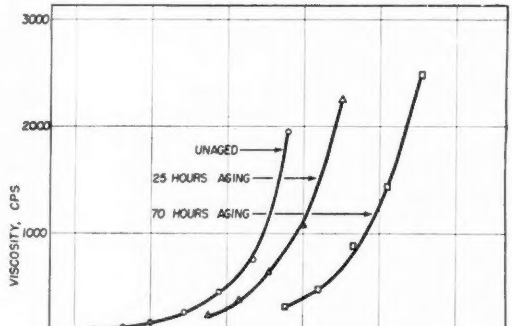

Fig. 8. Effect of aging in reactor on the viscosity of X-753 latex

the range of 500 to 1500 cps. at 58 to 60% solids. To meet this requirement, the X-753 type of latex used in this study should have an average particle diameter in the range of 1800 A. U. or above. Figure 8 and Table 8 show that J-6475 (X-753 type) latex reached a viscosity of 1500 cps. at about 58% solids. This batch, however, differs from regular X-753 in that it was shortstopped at 37% conversion, and the final stabilizer was not used. The addition of the electrolyte and dispersing agent contained in this final stabilizer would have reduced the viscosity to the desired range at 60+% solids. A study of the data in Table 10 shows that the latex polymerization recipe must have less than 75 parts of water per 100 parts of monomers in order to give the desired particle size for a fluid 60+% solids latex.

TABLE 10. EFFECT OF MONOMER/H_2O RATIO ON PARTICLE SIZE

Polymerization recipe: B/S variable (70/30 ratio), DIBHP* 0.1, SFS† 0.1, $FeSO_4 \cdot 7H_2O$ 0.002, EDTA‡ 0.004, K-Oleate 2.0, Dispersing Agent 1.0, Na_2SO_4 0.5, H_2O 50.

Monomers Charged	Hydrocarbon/ H_2O Ratio§	H_2O/100 G. of Monomers	Optical Density	Particle Size (A. U.)	Relative No. of Particles per Unit Weight
100	2.9	50	1.16	2100	4
67	2.0	75	0.66	1600	7
50	1.5	100	0.35	1150	12
33	1.0	150	0.10	700	32
25	0.7	200	0.036	500	55
12.5	0.4	400	0.012	320	106
6.2	0.2	800	0.008	250	100

*Diisopropyl benzene hydroperoxide.
†Sodium formaldehyde sulfoxylate dihydrate.
‡Ethylene diamine tetra-acetic acid, tetra-sodium salt.
§Volume ratio at 0% conversion.

The exact particle size necessary for fluidity at 60% solids varies somewhat with different formulations, as does the hydrocarbon/water ratio necessary to obtain it. For example, the X-758 recipe (Table 2), because of its high level of electrolyte (which helps cause agglomeration), gives a larger particle size at about the same hydrocarbon/water ratio than does X-753 (compare Tables 8 and 9). In addition, higher electrolyte and dispersing agent content of X-758 gives a lower viscosity at the same average particle diameter. Another factor known to affect viscosity is the particle size distribution,[18] with wider distribution usually giving lower viscosity.

Conclusions

It has been shown that it is possible to prepare high solids latex by polymerizing to an intermediate solids content and particle size, followed by solvent agglomeration and concentration. It has also been shown that a somewhat similar agglomeration normally takes place at intermediate conversions in conventional high solids latex recipes. The slow rates of polymerization in the latter recipes after agglomeration are primarily due to the greatly reduced number of particles present. The ratio of hydrocarbon to water is very important in determining the extent of agglomeration both during and after polymerization.

(Continued on page 486)

[18]A. Nisonoff, W. E. Messer, L. H. Howland, *Anal. Chem.*, 26, 856 (1954).

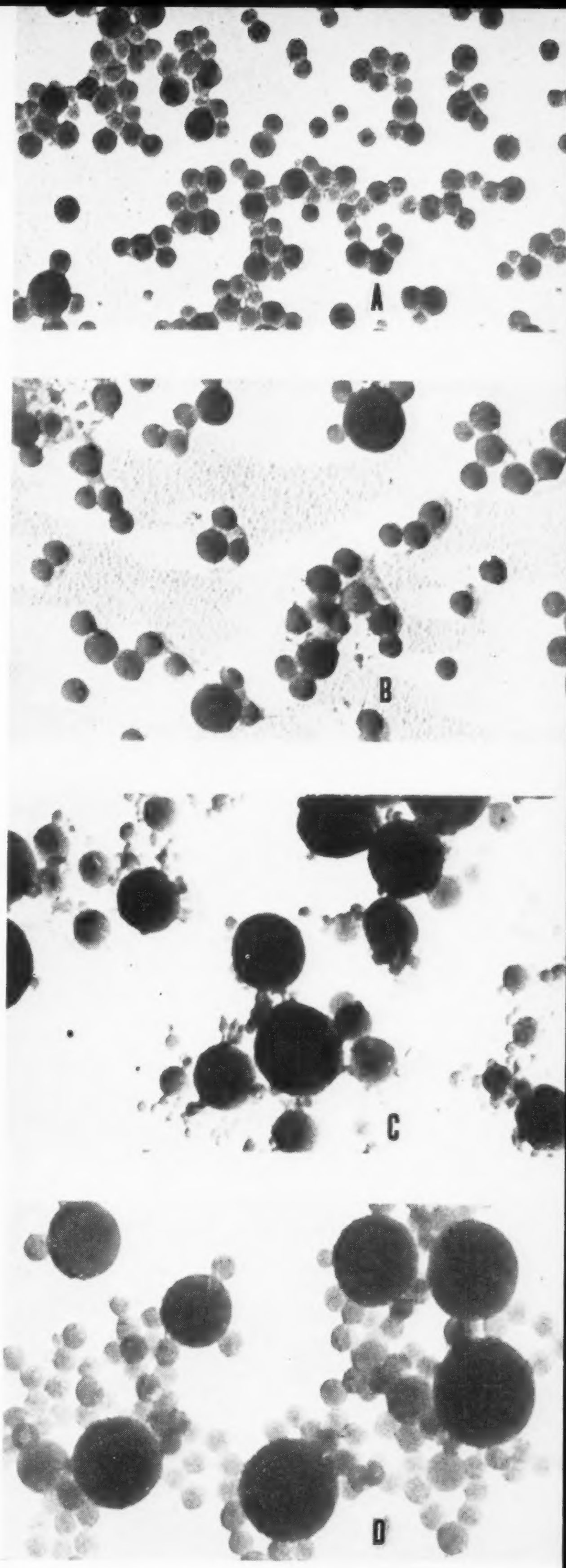

Fig. 9. Particle growth of X-758, high solids, GR-S type of latex during polymerization (magnification, 48,000 times). A—12% conversion; B—20% conversion; C—28% conversion; D—60% conversion

Material Laboratory Compression Stress Relaxation Apparatus[1]

By S. A. ELLER and C. K. CHATTEN

New York Naval Shipyard, Brooklyn 1, N. Y.

The Material Laboratory compression stress relaxation apparatus is similar to that described in Method B of ASTM D395 for measuring the compression set of vulcanized rubber at constant deformation. An important new feature of the apparatus is an electrical means to indicate when the back force of the compressed specimen is equal to the external load applied by the load measuring device.

The good reproducibility of the data obtained with this apparatus recommends its use in investigating stress relaxation characteristics of elastomer materials in compression.

STRESS relaxation is defined as the decrease with respect to time in the back stress exerted by a compressed material. As such, it is a very significant functional property of gasket materials used to maintain a seal between metal parts as Navy door hatches and pipe line flanges. Because of the importance of this property, it has received considerable attention in the research program on rubber materials being conducted under the general guidance of T. A. Werkenthin, of the Bureau of Ships, Navy Department, Washington, D. C.

The apparatus and test procedure described below were developed by personnel of the New York Naval Shipyard Material Laboratory in cooperation with Subcommittee 17 of Committee D-11 of the American Society for Testing Materials. A report[2] describing the apparatus was first made to Subcommittee 17 in 1954.

As the apparatus showed promise, arrangements were made for Garlock Packing Co. to use three of six available test jigs, and the Material Laboratory to use the remaining three jigs to test identically prepared specimens. The objectives of these tests were to improve the testing technique and to determine whether check results could be obtained between laboratories. This article is based on a report[3] made in February, 1955, to Subcommittee 17 containing the results of this round-robin test.

Description of Apparatus

The stress relaxation apparatus is shown positioned on a manually operated load measuring device in Figure 1 and in cross-section in Figure 2. Essentially this apparatus is similar to that used in measuring the compression set of vulcanized rubber at constant deformation, described in Method B of ASTM D395.[4] The test specimen, ½-inch thick by 1.129 ± 0.010-inch diameter, is compressed between parallel steel plates to the height determined by metal shims. The part of the apparatus that actually compresses the specimen is a load applicator which slides with minimum friction in vertical ball bushings secured to the top plate. The load applicator has a flange that is in metal-to-metal contact with the underside of the top plate. Except for this metal-to-metal contact, the load applicator is insulated electrically from the top plate, and a resistance meter is connected to measure the change in electrical resistance at this contact.

When the apparatus is assembled and an external load is applied to the top of the load applicator, the forces acting on the load applicator, assuming zero friction at the ball bushing, are:

F_s—an upward force due to the back stress in the compressed specimen

F_p—a downward force exerted by the top plate on the flange of the load applicator

F_w—a downward force due to the weight of the load applicator

F_e—an external downward force applied by the load measuring device

Since the load applicator is in equilibrium, the upward force is equal to the sum of the downward forces. The basic equation for this condition is:

$$F_s = F_p + F_w + F_e$$

Four situations occur as F_e is increased from 0 to the force necessary to measure the back stress in the compressed specimen; the basic equation is applicable to each of these situations and is helpful in understanding what is occurring in the apparatus.

Situation 1—When $F_e = 0$,
then $F_s = F_p + F_w$.

This is the situation prior to application of external

[1] The opinions or assertions contained herein are the private ones of the authors and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

[2] Report by C. K. Chatten to Subcommittee 17 of ASTM Committee D-11, Chicago, Ill., June 16, 1954.

[3] Report by S. A. Eller to Subcommittee 17 of ASTM Committee D-11, Cincinnati, O., Feb. 2, 1955. See also "Stress Relaxation in Compression and Tension," by S. A. Eller, *ASTM Bulletin*, July, 1955.

[4] "ASTM Standards on Rubber Products, December, 1954," p. 153. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa.

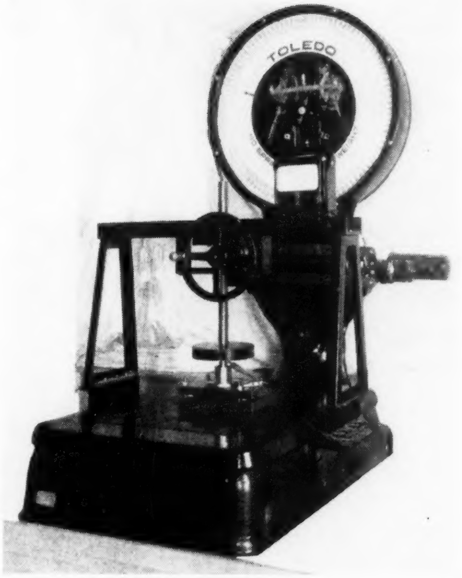

Fig. 1. Material Laboratory compression stress relaxation apparatus on manually operated loading device

force on the load applicator and indicates that the back force in the specimen is being resisted by the force of the top plate and the weight of the load applicator.

Situation 2—When $F_w + F_e$ is less than F_s,
then $F_s = F_p + F_w + F_e$.

All the forces that are in the basic equation are needed to express this situation. Since F_s may be considered constant during the small time interval required to determine this magnitude, an increase in F_e results in a corresponding decrease in F_p, F_w being a constant.

Situation 3—When F_e has been increased so that $F_p = 0$,
then $F_s = F_w + F_e$.

This indicates that the force of the top plate, which cannot be readily determined and is now equal to 0, is being replaced by F_e, which is the known force applied by the load measuring device.

Situation 4—When F_e has been increased so that $F_w + F_e$ exceeds F_s,
then $F_s + \Delta F_s = F_w + F_e$ ($F_p = 0$).

This indicates that an additional upward force ΔF_s resulting from further compression of the specimen is required to counterbalance the downward forces. Additional compression of the specimen results in separation of the load applicator from the top plate at the metal-to-metal contact of these parts. This separation is detected on the meter as a change in electrical resistance at the contact junction.

From Situation 4 above, the specimen is least affected when ΔF_s is the minimum possible. Therefore the sum of $F_e + F_w$ required to cause the first definite change in electrical resistance at the metal-to-metal contact is taken as F_s (back force in the specimen). On the jigs, only about ½-thousandth-inch additional compression of the specimen is required to measure this back force. Because of this fact, and as no manipulation of the specimen is required once the jig is assembled, the back force can be determined as often as desired without affecting the conditions under which the specimen is being aged.

For convenience in adjusting the percentage deformation of the specimen and to decrease the number of shims required, the bottom plate of the apparatus was equipped with a base plug (Figure 2). The underside of the plug was divided into 25 divisions, and the plug was machined with 40 threads per inch. Thus each division corresponds to 0.001-inch in the relative elevation of the plug with respect to the bottom plate.

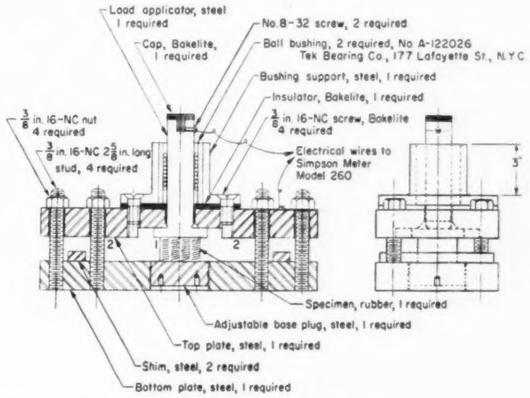

Fig. 2. Cross-section of Material Laboratory compression stress relaxation apparatus

Procedure Used at the Material Laboratory

The height of the specimen was measured with a dial gage micrometer equipped with a ¼-inch diameter flat base foot and a three-ounce weight. Based on this height measurement, metal shims were selected, and the base plug was adjusted to permit 20% deformation of the specimen. The specimen was then centered on the base plug, and the apparatus assembled with the load applicator and top plate resting on the specimen. Thus assembled, the apparatus was placed on a Toledo scale equipped with a cross-brace and loading column, as shown in Figure 1.

External load was applied to the top of the load applicator at a rate equal to movement of about 0.05-inch per minute of the load applicator until the specimen was deformed 20%. When this deformation occurred, the top plate made contact with the shims. Additional compression of the specimen was detected as a break in the metal-to-metal contact of the load applicator and top plate. The instance separation occurred a stop watch was started. The four bolts on the apparatus were then immediately tightened twice around with a torque wrench to a torque of 10 lb-ft., after which the external load was immediately released.

At three minutes ± 10 seconds after deformation, the back force in the unaged specimen was determined. This force was taken as the external load required to cause the first change in electrical resistance on the meter. An alternate procedure which merits consideration is to

TABLE 1. NATURAL RUBBER

Jig No.	Specimen No.	Height, In.	Diameter, In.	Back Stress, Psi. Initial	Back Stress, Psi. Final	Stress Relaxation, %	Compression Set, % 10 Sec.	Compression Set, % 30 Min.
				Tested at the Material Laboratory				
1	M1	0.504	1.118	81.2	50.6	37.7	40	38
3	M2	0.500	1.125	89.2	55.5	37.8	38	37
5	M3	0.498	1.120	89.0	50.5	43.3	38	36
1	M4	0.508	1.124	88.4	54.1	38.8	36	35
3	M5	0.502	1.112	88.8	56.8	36.0	35	34
5	M6	0.512	1.121	90.9	58.5	35.6	36	34
1	M7	0.510	1.119	86.6	54.1	37.5	38	36
3	M8	0.507	1.120	90.5	54.0	40.3	38	36
5	M9	0.502	1.120	89.5	56.0	37.4	38	37
	Avg.	0.505	1.120	88.2	54.5	38.3	37.5	35.9
				Tested at Garlock Packing Co.*				
2	G1	0.506	1.123	90.6	56.2	38.0	40.6	39.6
4	G2	0.503	1.125	91.2	59.1	35.2	40.8	39.2
6	G3	0.498	1.124	91.4	57.2	37.4	40.2	39.6
2	G4	0.490	1.131	93.3	61.4	34.2	40.8	39.8
4	G5	0.493	1.124	92.4	61.3	33.7	40.6	39.6
6	G6	0.495	1.121	94.9	62.5	34.1	40.4	39.4
2	G7	0.496	1.128	85.8	55.8	35.0	31.7	30.2
4	G8	0.499	1.131	86.3	56.4	34.6	32.1	30.0
6	G9	0.502	1.125	88.2	57.0	35.4	32.4	30.9
	Avg.	0.498	1.126	90.5	58.5	35.7	37.7	36.1

* Specimens subjected to previous stress relaxation test for 24 hours at room temperature and 20% compression prior to the test reported herein.

determine the external load before and after three minutes and to plot these results in order to obtain the external load at exactly three minutes.

The assembled apparatus with the sample was conditioned for 60 ± 5 minutes at room temperature; next it was aged in a Geer oven for 46 hours at 194 ± 2° F. The apparatus was then removed from the oven and allowed to cool for five hours ±5 minutes at room temperature. It was then replaced on the Toledo scale, and the back stress in the aged specimen was again measured. The jig was then disassembled, and the height of the specimen was measured first after 10 seconds and again after 30 minutes after removal from the apparatus. These data were taken in order to calculate compression set of the specimen in accordance with the equation given in Method B of ASTM D395.

Procedure Used at Garlock Packing Co.

The procedure used by Garlock Packing Co. was basically the same as that used by the Material Laboratory. Some deviations were made, however, because of differences in accessory equipment. These differences were:

1. A Baldwin-Southwark[5] tester which could not be locked in any fixed position was used to apply external load on to the apparatus.

2. The jigs were closed in an air-operated arbor press which developed 385 pounds. This force was applied on a steel ring surrounding the vertical bushing to force the top plate down on to the shims. The jigs were then transferred immediately to the Baldwin-Southwark machine for determination of the back force exerted by the unaged specimen.

3. The meter used to indicate disengagement between the load applicator and the top plate employed a milliammeter scale and a flashlight cell. The reading was taken at the first movement of the needle, although it was noted that two more pounds load were needed to discharged the current completely.

[5] Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.

Test Specimens

The specimens used for the inter-laboratory test were prepared from press-cured slabs of natural rubber and GR-S; each slab measured six- by six- by ½-inch thick. The specimens were first cut to a diameter of 1¼ inches and then edge ground to a nominal diameter of 1.129 inches. Eighteen specimens were prepared in an identical manner at the Material Laboratory from each elastomeric material. The specimens prepared from one side of the slabs were tested at Garlock Packing; while those from the other side were evaluated by the Material Laboratory. Specimens numbered 1, 2, 3 were prepared from slab I, specimens 4, 5, 6 from slab II, and specimens 7, 8, 9 from slab III, respectively. (See Tables 1 and 2.)

Calculations of Results

The following calculations were made on the data:

1. Back stress in the specimen

$$S = \frac{L + W}{A}$$

where S = back stress, psi.
L = external load required to cause the first change in electrical resistance, lbs.
W = weight of load applicator, lbs.
A = original cross-section area of specimen, sq. in.

TABLE 2. GR-S

Jig No.	Specimen No.	Height, In.	Diameter, In.	Back Stress, Psi. Initial	Back Stress, Psi. Final	Stress Relaxation, %	Compression Set, % 10 Sec.	Compression Set, % 30 Min.
			Tested at the Material Laboratory					
1	M1	0.516	1.128	152.9	48.8	68.1	72	68
3	M2	0.515	1.132	155.8	48.9	68.6	71	66
5	M3	0.512	1.132	154.8	49.9	67.8	70	69
1	M4	0.512	1.129	159.7	49.7	68.9	71	67
3	M5	0.504	1.125	158.7	50.0	68.5	71	67
5	M6	0.517	1.123	165.3	53.7	67.5	70	67
1	M7	0.510	1.123	155.2	51.2	67.0	72	66
3	M8	0.514	1.116	153.1	50.3	67.1	68	66
5	M9	0.512	1.120	141.8	46.9	66.9	70	65
	Avg.	0.512	1.125	155.3	49.9	67.8	70.6	66.8
			Tested at Garlock Packing Co.*					
2	G1	0.521	1.132	159.6	61.3	61.4	64.3	59.5
4	G2	0.516	1.128	155.9	59.8	61.6	66.0	60.0
6	G3	0.508	1.122	159.5	61.4	61.5	65.0	59.0
2	G4	0.503	1.121	160.8	59.5	63.0	65.5	58.5
4	G5	0.508	1.130	161.2	61.5	61.8	66.0	58.0
6	G6	0.499	1.133	149.5	53.3	64.3	68.0	65.5
2	G7	0.514	1.123	147.0	65.3	55.6	66.0	60.3
4	G3	0.513	1.131	146.0	57.4	60.7	65.3	59.5
6	G9	0.512	1.121	149.6	57.5	61.6	66.5	59.5
	Avg.	0.510	1.127	154.3	59.7	61.3	65.8	60.0

* Specimens subjected to previous stress relaxation test for 24 hours at room temperature and 20% compression prior to the test reported herein.

2. Stress relaxation

$$S.R. = \frac{S_I - S_C}{S_I} \times 100$$

where S.R. = stress relaxation, %

S_I = back stress exerted by the specimen in the initial condition, three minutes after deformation, psi.

S_C = back stress exerted by the specimen after conditioning, psi.

NOTE. Stress relaxation is independent of specimen area as the latter factor cancels out of the stress relaxation equation. Thus, if stress relaxation data only are desired, the total load required for the specimen in the initial and conditioned states may be substituted for the respective stress values in equation two above.

3. Compression set of the specimens 10 seconds and 30 minutes after removal from the apparatus was calculated in accordance with the equation given in Method B of ASTM D395.

The results obtained in the inter-laboratory test on the natural rubber and GR-S specimens are tabulated in Tables 1 and 2, respectively.

Analysis of Results

The data obtained by the Material Laboratory were reviewed by F. C. Thorn, of Garlock Packing, who commented as follows:

1. The deviation in results obtained on the natural rubber specimens is about the same for both laboratories. In addition, both laboratories agree that the lowest relaxation is shown by slab II (specimens 4, 5, 6), the next best by slab III (specimens 7, 8, 9) and the poorest by slab I (specimens 1, 2, 3). The Garlock specimens from slab III (specimens 7, 8, 9) seem to be slightly under cured, as shown by low loads, both initial and final.

2. The GR-S specimens tested at both laboratories check very closely on initial gage and load. As the results obtained at Garlock indicate less relaxation and lower compression set, there may have been a temperature difference between ovens. Both laboratories agree, however, in rating the slabs in the following sequence, —III, I, II.

The data were also subjected to statistical analysis by the Material Laboratory. This analysis indicated that the degree of reproducibility of stress relaxation results within each laboratory is about 4% for both the natural rubber and GR-S specimens. In addition, the results obtained at the Material Laboratory on the overall average were about 6% higher than those obtained at Garlock Packing.

The difference in results between laboratories may be attributed to one or more of the following factors:

1. Differences in sensitivity of instruments used to detect break in the metal-to-metal contact of the load applicator and top plate.

2. Side of slab from which specimens were tested.

3. Differences in oven temperatures.

4. Differences in calibration and operating characteristics of devices used to apply external load on the apparatus.

Conclusions

The good reproducibility of data obtained both by Garlock Packing and the Material Laboratory indicate that the herein described apparatus has merit for use in investigating the stress relaxation characteristics of elastomer materials in compression. In using the apparatus the specimens are subjected to simulated service conditions and are not manipulated or otherwise ma-

(Continued on page 486)

Temperature Control during Mixing of Rubber Compounds[1]

By FRANK L. ROTH, GEORGE E. DECKER, and ROBERT D. STIEHLER
National Bureau of Standards, Washington, D. C.

The properties of rubber vulcanizates are dependent on the temperature compound during mixing. No practical method is available for controlling the temperature of conventional mill rolls because of the slow rate of heat transfer.

Specially designed rolls for a six- by 12-inch laboratory mill designed at the National Bureau of Standards permit automatic control of roll surface temperatures to within 7° F. during the mixing of natural and synthetic rubber compounds.

IT IS well known that the properties of natural rubber vulcanizates are dependent on the temperature of the compound during the mixing process.[2] Schade and Roth[3] noted that the properties of synthetic rubber compounds and of the resulting vulcanizates also depended on the mixing temperature. This effect of mixing temperature is recognized in the Specifications for Government Synthetic Rubbers[4] and ASTM Designation D15-52T,[5] both of which prescribe limits for the temperature of the mill roll surfaces during mixing.

Even though these limits permit a range of 18 or 20° Fahrenheit in the surface temperature, it is difficult to maintain the required temperature control because the rate of heat transfer through the conventional thick-walled roll is too slow. Part of the variations in results within and among laboratories is undoubtedly caused by variability in the temperatures of the rubber compounds during mixing.

At the request of the Office of Synthetic Rubber the effect of mixing temperatures on the properties of GR-S vulcanizates and various means of controlling the temperature during mixing have been under investigation at the National Bureau of Standards during the last 10 years. Two methods of control were considered: (1) keeping the rubber compound at a constant temperature throughout the mixing procedure, and (2) keeping the surfaces of the mill rolls at a constant temperature. In the first method of control a suitable sensing element and means to effect rapid changes in the temperature of the rolls would be essential. Since the achievement of such a control did not appear feasible, efforts were directed toward the second method.

[1]This investigation was conducted as part of a research project sponsored by the Federal Facilities Corp., Office of Synthetic Rubber, in connection with the Government Synthetic Rubber Program.

[2]Report of the Physical Testing Committee of the Division of Rubber Chemistry, *Ind. Eng. Chem.*, 17, 535 (1925).

[3]"Developments and Improvements in Methods of Stress-Strain Testing of Rubber, Symposium on Rubber Testing, ASTM-STP 74," p. 27. American Society for Testing Materials, 1916 Race St., Philadelphia, Pa. (1947).

[4]"Specifications for Government Synthetic Rubbers," Revised Edition, Reconstruction Finance Corp., Office of Synthetic Rubber, Washington, D. C. (Oct. 1, 1952).

[5]"Sample Preparation for Physical Testing of Rubber Products, ASTM Standard D15-52T, 1952 Book of ASTM Standards," Part 6, p. 1.

Effect of Mixing Temperature

The following compound was mixed on a mill having roll surfaces at temperatures of 100, 120, and 140° F. in early studies in 1945.

Ingredient	Parts by Weight
X-179 GR-S	100
RRC Std. Channel Black	50
Softener (coal tar)	5
Zinc oxide	5
Sulfur	2
Mercaptobenzothiazole	1.5
Total	163.5

The mixing procedure was the same at each temperature, and the temperature of the roll surfaces was measured with a surface pyrometer and was manually controlled within 5° F. of the desired temperature throughout the mixing process. Three batches were mixed at each temperature.

The Mooney viscosity of the compounds is given in Figure 1. It is seen that the Mooney viscosity of the compound increased about six units for an increase in

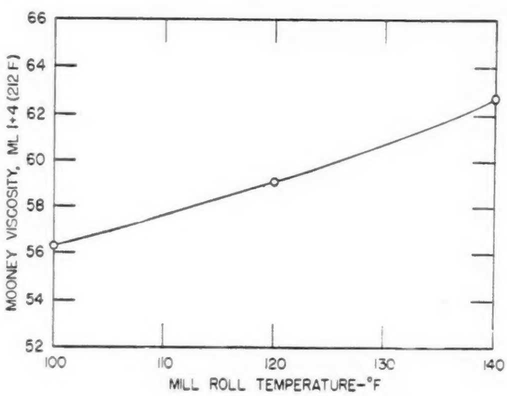

Fig. 1. Effect of surface temperature of mill rolls on Mooney viscosity of a GR-S compound. Each point is the average of three mixes prepared on different days

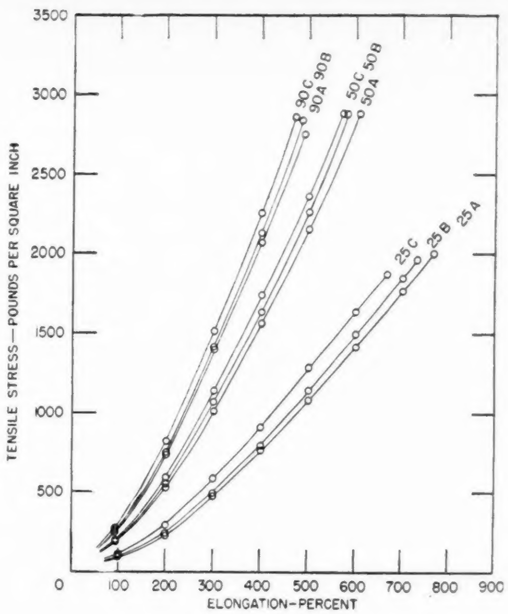

Fig. 2. Effect of surface temperature of mill rolls on stress-strain properties of a GR-S compound. The numerals 25, 50, and 90 indicate the cure in minutes at 292° F., and the letters A, B, and C refer, respectively, to temperatures of 100, 120, and 140° F. for the surfaces of the mill rolls during mixing of the compound

roll surface temperature from 100 to 140° F.

The tensile stress *versus* elongation curves of vulcanizates cured 25, 50, and 90 minutes at 292° F. are given in Figure 2. An increase in roll surface temperature resulted in an increase in stiffness and a decrease in elongation at failure. The increase in stress at 300% elongation was about three pounds per square inch per degree Fahrenheit for all levels of cure. The decrease in ultimate elongation was greatest for the shortest cure and least for the longest cure. The effect of mixing temperature on stress at failure was not significant. The results of this study indicated that GR-S compounds, like those of natural rubber, require temperature control during mixing if reproducible values for their properties are to be obtained.

Mill Rolls Designs—New and Old

Most of the nominal six- by 12-inch laboratory mill rolls are constructed like the design shown in Figure 3. The thickness of the walls is two inches or more, and cooling is obtained by spraying water against the inner walls. This arrangement results in a rate of heat transfer that is too slow to control the temperature of the surfaces within a few degrees.

One-Inch Wall Rolls

The first attempt to increase the rate of heat transfer was the construction of rolls like the design in Figure 3, except for a reduction in wall thickness to one inch. The rate of heat transfer of these rolls was much greater than that of conventional rolls, but still insufficient to obtain the desired control of temperature of the roll surfaces.

Spiral Grooved Rolls

The next roll studied is shown schematically in Figure 4. This roll, developed by a rubber machinery manufacturing company, consists of three principal parts: (1) a mandrel about $4\frac{5}{8}$ inches in diameter having a central cavity $1\frac{1}{4}$ inches in diameter and two semicircular spiral grooves $\frac{5}{16}$-inch in radius cut into the outer surface; (2) a cylindrical inner shell $\frac{3}{16}$-inch in thickness which fits over the mandrel and makes two continuous ducts of the spiral grooves; and (3) a hardened outer shell $\frac{1}{2}$-inch in thickness which forms the working surface of the roll. The two spiral grooves are similar to a double-screw thread with a pitch of two inches. The two grooves are connected at one end by a hole diametrically through the mandrel to form a continuous duct. Part of the circulating fluid enters the central cavity as in a conventional mill, and part circulates through the spiral duct.

The mill with the spiral grooved rolls is provided with thermocouples fastened to the inner shell of each roll. The leads are brought to the end of the roll in a small spiral groove on the outside of the inner shell, then pass to the center of the mandrel and connect to slip rings at one end of the mandrel. An auto-

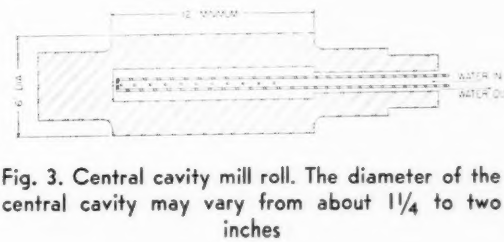

Fig. 3. Central cavity mill roll. The diameter of the central cavity may vary from about $1\frac{1}{4}$ to two inches

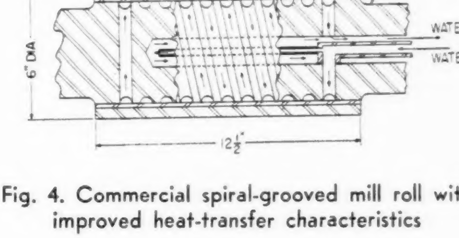

Fig. 4. Commercial spiral-grooved mill roll with improved heat-transfer characteristics

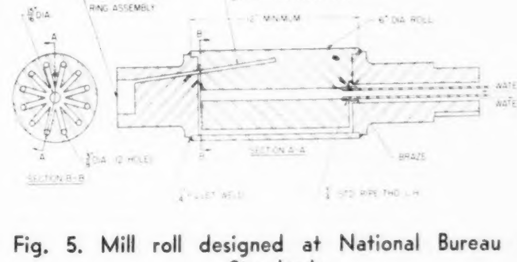

Fig. 5. Mill roll designed at National Bureau of Standards

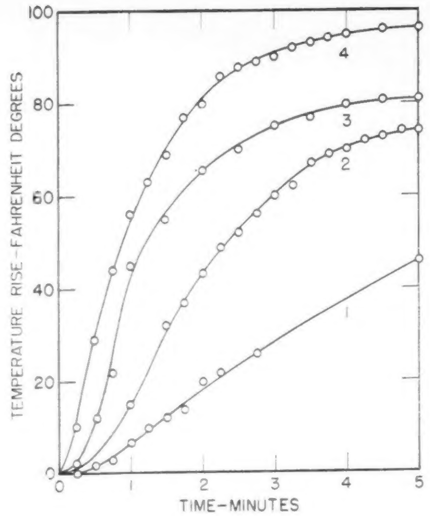

Fig. 6. Temperature changes of mill roll surfaces following an increase of 100° F. in the temperature of the circulating fluid: (1) central cavity roll with a wall thickness of two inches; (2) central cavity roll with a wall thickness of one inch; (3) spiral grooved roll, (4) NBS roll

matic temperature controller-recorder and pneumatically operated valves for each roll are provided to control its temperature.

The rate of heat transfer between the circulating fluid and the surface of these rolls is greatly increased over that of single cavity rolls with a one-inch wall. The temperature control system on this mill operates satisfactorily for mixing compounds that require only small amounts of power, particularly if the temperature of mixing is not too low. However, when rubber compounds requiring large amounts of power are mixed at 104 or 122° F., there is a temperature difference as high as 30° F. between the thermocouples and the roll surface, and there are temperature differences of as much as 10° on the roll surface. The respective differences are caused mainly by the interface between inner and outer shells and by the long continuous spiral duct.

NBS Rolls

Figure 5 shows the design of a roll developed at the National Bureau of Standards, based on experience with rolls previously described. In this roll the circulating fluid enters the central cavity and returns through 12 parallel ducts ⅜-inch in diameter, with center lines ⅝-inch from the surface. A well is provided to permit a thermocouple being placed within ¼-inch of the roll surface. The thermocouple lead wires are connected to slip rings at the end of the roll shaft.

Heat Transfer Characteristics

The relative heat transfer characteristics of the four rolls investigated were determined by circulating water at approximately 70° F. through the rolls until steady state conditions were reached. The temperature of the circulating water was then increased by 100° (i.e., to about 170° F.), and the temperature of the roll surface was measured at frequent intervals. The rate of water flow was 3.5 to 4 gallons per minute except in the case of the spiral grooved roll in which the resistance reduced the flow to about two gallons per minute even though the pressure was increased fivefold over that used for the NBS roll.

The increase in temperature of each roll surface is shown as a function of time in Figure 6. The time required for the temperature of the surface of the roll with a two-inch wall to increase 50° F. was more than five minutes. Reducing the wall thickness of the roll to one inch decreased this time to 2¼ minutes. For the spiral grooved roll this time was 1.2 minutes, and for the NBS roll it was about 0.8-minute. It was also noted that the maximum temperature differences on the surface of the NBS roll was 2° F.

Temperature Control during Mixing—NBS Rolls

The following systems for controlling the surface temperature of the NBS rolls were investigated:

(1) Automatic recorder-controller and mixing valve for each roll actuated by thermocouples in the outlet water from the rolls.

(2) Same as (1) except actuated by thermocouples in the rolls.

(3) Single automatic recorder-controller and mixing valve actuated by thermocouple in the fast roll (33.6 rpm.).

(4) Same as (3) except actuated by thermocouple in the slow roll (24 rpm.).

In the first system the temperature of the outlet water was held constant, but that of the roll surfaces depended on the power required to mix the compound. For mixing GR-S Black compounds, the surface temperature reached more than 10° F. above the desired temperature. In order to utilize this system, it would be necessary to adjust the control temperature of the

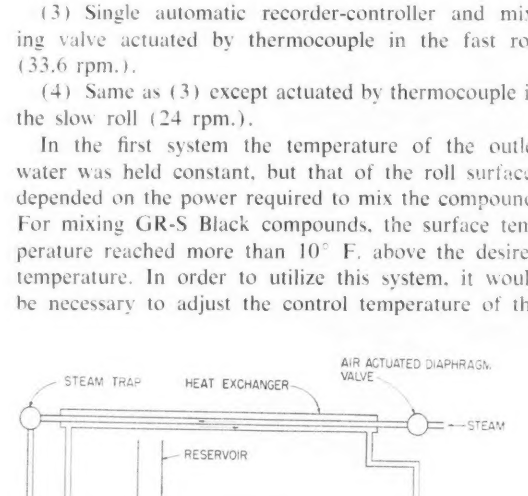

Fig. 7. Circulating system for heat transfer fluid

exit water for the particular compound being mixed in order to maintain temperature on the roll surfaces near the desired point.

The other three systems were satisfactory for maintaining the temperature on the roll surfaces close to the control point. The second system provided the best control since there was independent control of each roll. This system, however, required dual control equipment, and the small improvement in precision hardly justified the additional cost.

The fourth system was adopted for mixing rubber compounds banded on the slow roll. In mixing most rubber compounds with this system, the surface of the fast roll became slightly cooler than that of the slow roll. The only exception thus far noted occurred in mixing GR-I compounds, when the fast roll surface became hotter than that of the slow roll.

In mixing rubber compounds banded on the fast roll, the third system was preferable. A switch could be provided to change from one system to the other.

In order to minimize scale formation in the roll which would reduce the rate of heat transfer, the fluid passing through the rolls is circulated in a closed system, as shown in Figure 7. Two heat exchangers are used for heating or cooling, as required.

The controlled air pressure regulates the position of the three air-actuated diaphragm valves. The three-way pneumatically controlled mixing valve operates over a range in air pressures from 5 to 11 psig. The pneumatically controlled water valve begins to open as the air pressure decreases below 9 psig and is completely open at 2 psig. The pneumatically controlled steam valve begins to open as the pressure increases above 9 psig and is completely open at 15 psig.

For the water a ½-inch V-port valve is used, and for the steam a ¼-inch needle valve. For precise control, positive positioners are required on all valves.

Compounds and Mixing Procedures

The surface temperature of the fast roll was measured with a surface pyrometer every 30 seconds during mixing compounds of six rubbers on the NBS rolls using the temperature control system recommended above. The following formulas and mixing procedures described in ASTM Designation D15-52T[5] were used:

Rubber	Formula and Mixing Procedure
RSS Natural Rubber	Sections 3, 4, 5 (a), and 6 (a) for Channel Black Type
X-761 GR-S (GR-S 1500)	Sections 3, 4, 5 (c), and 8 (a) for GR-S-10 Channel Black Type
X-537 GR-S (GR-S Black Masterbatch containing 55 parts HAF Black pbr.)	Sections 3, 4, 5 (c), and 8 (a) for GR-S-10 Channel Black Type except for using 155 parts of the GR-S Black Masterbatch and omitting the EPC Black and step 3 in the mixing procedure
GR-I-18	Sections 3, 4, 5 (e), and 9 (a) for Channel Black Type
Hycar OR-25	Sections 5 (f) and 10 (a) except that 20 minutes, instead of 7, were required to add the black in step 2
Neoprene GN-A	Sections 3, 4, 5 (d), and 7 (a) for Channel Black Type

Compounds containing black were selected since control of their temperature during mixing, particularly that of X-537 GR-S, is the most difficult. The control temperature was 104° F. for the GR-I-18 compound, 158° F. for the natural rubber compound, and 122° F. for the others.

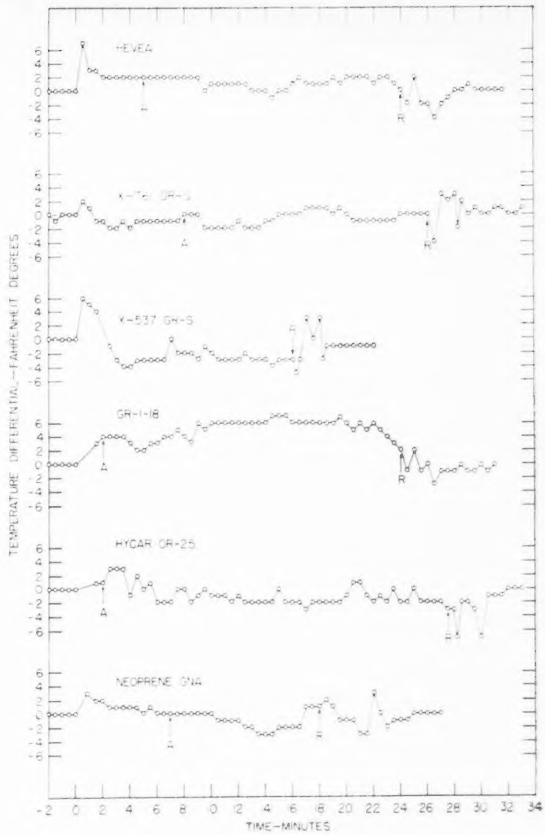

Fig. 8. Variation in surface temperature of the fast roll during mixing of rubber-black compounds on NBS rolls. The regulating thermocouple was in the slow roll. Rubber was put on the rolls at zero time; addition of black began at *A*, and the compound was first removed from the rolls at *R*. The zero points on the temperature differential scales correspond to 158° F. for *Hevea*, 104° F. for GR-I-18, and 122° F. for other rubbers

Experimental Results

The deviations of the surface temperature of the fast roll from the control temperature were plotted for the entire period of mixing each compound, as shown in Figure 8. The rubber was placed on the rolls at zero time. The surface temperature immediately increased, but was under control within two minutes except in the case of GR-I-18 and Hycar OR-25. GR-I-18 behaved anomalously as previously noted. Hycar OR-25 formed a lacy, instead of a solid band and did not adhere tightly to the slow roll until most of the black was added.

The maximum deviation for any compound was 7° F., and the deviation during the major portion of the mixing period was usually within 2° except for X-537

GR-S and GR-I-18. The surface temperature of the fast roll was about 3° lower than the control point during mixing of X-537 GR-S and about 6° higher during mixing of GR-I-18. In both cases the surface temperature of the slow roll was constant within the precision of the measurements (about 1° F.).

If each roll were separately controlled, the surface temperatures of both rolls would be expected to be within 2° F. of the control point except possibly for the first two minutes after the rubber has been banded on the rolls. When the rubber compound was removed from the rolls, there was a temporary decrease in the surface temperature of both rolls. When the compound was rolled and passed end-wise through the rolls, the surface temperature fluctuated about 4° above and below the control point.

Summary and Conclusions

A study was made of the effect of the surface temperature of the rolls of a six- by 12-inch laboratory mill on the properties of GR-S compounds and means of controlling this temperature. It was found that the properties of the GR-S compound depend on the surface temperature of the mixing rolls.

No practical method of controlling the temperature of conventional rolls was found because of the slow rate of heat transfer. Therefore three types of special rolls, including one designed at the National Bureau of Standards, were investigated. The heat transfer characteristics of the NBS rolls permitted automatic control of their temperatures to within 7° F. during mixing of natural rubber and several synthetic elastomers, with only one controller being used.

A mill with the special NBS rolls has been in operation for about a year and has resulted in a marked improvement in the control of mixing of rubber compounds. The automatic temperature control has been much more convenient than manual control and has saved considerable time since the rolls do not have to be warmed by milling scrap rubber.

Material Laboratory Apparatus

(Continued from page 481)

terially affected when reading of back force are taken. In addition, the apparatus is suitable for use in measuring the compression set of rubber materials in accordance with Method B of ASTM Method D395.

Acknowledgment

The authors wish to thank F. C. Thorn, of Garlock Packing Co., for participating in the round-robin test program and for analyzing the test results. Thanks are also due to John J. Mahon (now on leave in the U. S. Army) for conducting the tests at the Material Laboratory.

Thanks are also due to S. R. Doner, of Raybestos-Manhattan, Inc., chairman of Subcommittee 17, for his cooperation in this investigation.

Growth and Agglomeration

Acknowledgment

(Continued from page 477)

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NBS Develops Laboratory Testing of Meteorological Balloons

A laboratory method for predicting the flight performance of neoprene aerological sounding balloons has been developed by G. M. Martin, John Mandel, and R. D. Stiehler, of the National Bureau of Standards at the request of the U. S. Navy Bureau of Aeronautics. The laboratory method has been sought for to save the cost of actual flight-testing.

According to the Bureau of Standards, the method effectively simulates actual flight conditions by giving a small sample of the balloon material a two-dimensional stretch at temperatures approximating those encountered at high altitudes. From measurements made on the stretched material, the maximum altitude to be expected in flight can be computed.

Sounding balloons are usually made of a neoprene film with an unstretched thickness of about 0.003-inch and a weight of 500-600 grams. These balloons are inflated with hydrogen or helium to a specified lift and rise about 0.3-kilometer a minute. The NBS test, however, uses superdry nitrogen in order to minimize the amount of water vapor present, which would otherwise introduce an extraneous factor.

In the test, a circular piece of the neoprene film is clamped around its circumference and inflated over a 15-20-minute period, while measurements are made of the differential pressure across the patch, the distance between bench marks on its surface, and the maximum dimension of the patch. The inflation is carried out inside a cold box maintained at the desired temperature by a detachable servo unit.

The measurements continue until the balloon has burst. From the data the average ultimate elongation and bursting pressure of the balloon material tested are obtained. Because a balloon drifting into the upper atmospheres eventually becomes an oblate spheroid, the stress-strain characteristics vary across its area. In the NBS lab test, therefore, the pressure differences from patch to patch must be ascertained.

This final estimate is based on two statistically determined quantities: the effective elongation and the

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EDITORIALS

Should and Could There Be Standardized Coding of Synthetic Rubbers?

NOW that the government synthetic rubber producing facilities have been transferred to private industry, the very considerable advantages of competition among the several producers of GR-S type copolymers will benefit the consumers of these rubbers in the quality of the material and the technical service provided, as well as in eventual lower cost. There may be some temporary disadvantages, however, since the consumer has, in some cases, as many as seven different sources of a given grade of GR-S type rubber, and the method of identifying this grade may not always be so good as that used previously by the government operating agency.

The majority of the producers of GR-S type rubbers has retained the numerical suffixes used by the government to identify the so-called "hot" or "cold" or "hot pigmented" or "cold masterbatched" copolymers. Compounders are beginning to wonder, however, how long these suffixes will be retained and whether the information regarding polymerization method, composition, types of carbon blacks and/or oils in masterbatches, and similar information will be available from the several producers. Most of the price lists received to date have included most of this information, but some have not.

There is also some concern as to the methods that will be used by the several producers to code new rubbers as they are developed, that is, will the coding system be universal, or will each producer use a different system?

The number of commercial GR-S dry polymers and latices in existence before plant disposal was about 50, but with nine producers of these rubbers and latices, the number of trade names and designations has multiplied severalfold, even though not all of the producers are making all of the 50 or more previous government commercial grades.

The question of the moment is whether or not a cooperative effort will be developed by the producers for identifying and coding their GR-S type polymers, and whether this effort, if made, will provide consumers with adequate information and will not result in any legal problems for the producers.

The producers of GR-S type polymers have already taken one cooperative step in asking the D-11 Committee on Rubber of the American Society for Testing Materials to transfer the government test methods for synthetic rubbers to ASTM standards, after making such revisions and changes as might be decided upon by this committee. The committee engaged in this work includes representatives of both producers and consumers.

Should the job of maintaining a more or less standard system of identification of synthetic rubbers be included in the work of this ASTM committee, or should it be the job of an established trade association or of an association not yet formed, or should not attempt be made to standardize the synthetic rubbers on a cooperative basis?

If there are those among our readers who would like to express their opinions on this subject or other subjects as they develop during the transition period in synthetic rubber in this country, we would be glad to use the columns of RUBBER WORLD for a forum on such subjects.

R. G. Seaman
EDITOR

Meetings and Reports


G. Stafford Whitby

Details of Akron Rubber Group's Protective Materials Symposium—I

The January 28 meeting of the Akron Rubber Group at the Mayflower Hotel, Akron, O., was devoted to a symposium on "Protective Materials for Rubber: Antioxidants, Antiozonants, and Waxes," and the remarks of the moderator and of the five panelists are digested below. Presided over by G. Stafford Whitby, director of rubber research at the University of Akron, the panel consisted of A. M. Neal, E. I. du Pont de Nemours & Co., Inc.; G. C. Maassen, R. T. Vanderbilt Co., Inc.; D. E. Baker, Monsanto Chemical Co.; I. E. Cutting, Naugatuck Chemical Division, United States Rubber Co.; and A. R. Davis, American Cyanamid Co.

Questions and answers follow the speakers' addresses.

Introduction to the Symposium

G. S. Whitby
University of Akron

Antioxidants rank second only to accelerators among the critical components used in rubber compounding. The amount used is slightly less than 2% by weight of all the new rubber, natural and synthetic, consumed by industry. When we use the term antioxidant, we are really using it as an abbreviation for anti-auto-oxidant because the phenomenon is one of auto-oxidation, that is to say, of oxidation by the air without the application of drastic chemicals.

We do not yet fully understand the mechanisms by which the auto-oxidation of rubber takes place and by which antioxidants function in preventing it. We have had to proceed essentially on empirical lines in testing and selecting materials which will function satisfactorily in a practical way.

Most effective antioxidants can be classified as either phenols or aromatic bases. Compounds in these two classes have the ability in many instances to react readily with atmospheric oxygen. The original idea in trying to develop antioxidants was to find chemicals that would react preferentially with oxygen so that the rubber would be spared. We know that was the wrong theory, but it was the idea that started the search.

In considering the theory of the mechanism of the auto-oxidation of rubber and of antioxidant action we ought not to focus attention exclusively on the fact that the alpha-methylenic position in the rubber molecule is a position of special reactivity. Rubber is also full of double bonds. One out of every three of the carbon-to-carbon bonds in the chain is a double bond.

We ought also to take advantage of the study of the auto-oxidation of substances other than rubber in providing suggestions that may help us in the field of rubber. It would be wrong to claim that there is any strict parallelism between rubber and other types of oxidizable organic materials in regard to the precise choice of the most efficient antioxidant. Nevertheless there are broad similarities. In a study of the oxidation of molten paraffin wax by oxygen conducted by Morawetz, of Bakelite Corp., very many substances were examined as inhibitors of this oxidation of a saturated hydrocarbon.

Among the more effective inhibitors examined are quite a number of substances that we know to be antioxidants for rubber. Phenols, for instance, the so-called hindered phenols, where both the ortho and para positions are blocked; phenol sulfides, reaction products of phenols with sulfur chloride; and a rubber antioxidant used in Germany: namely, DOD, or di-para-hydroxy diphenyl. Another inhibitor of the oxidation of paraffin was butyl gallate, known to be an effective antioxidant in fats and vegetable oils to prevent rancidity. Again, di-secondary-butyl-para-phenylene-diamine, sold as a gasoline antioxidant, has also been recommended as a rubber antioxidant under the name Tenamene-2.

In our own work in trying to develop a screening test for antioxidants we have found that in almost all cases there seems to be a parallelism between the relative potency of antioxidants in rubber and the drying of films of an unsaturated alkyd where the unsaturation is derived from maleic anhydride, and alpha-methylene groups are lacking.

I suggest that we take a broad view of the problem of the mechanism of action of antioxidants. In the auto-oxidation of rubber we should not focus all our attention on the reactivity of the alpha-methylene group. If we pursue both fundamental studies and empirical investigations, we can expect to make still further advances than those already made.

General Antioxidants for Synthetic Rubber Products

A. M. Neal
E. I. du Pont de Nemours & Co., Inc.

The superior resistance of synthetic rubber products to the degradative effects of heat, oxygen, and ozone has been so thoroughly established that it is difficult to realize that one of the most serious deficiencies of the German methyl rubber of World War I was its extreme sensitivity to oxidation. Excluding Butyl and Hypalon, where most of the resistance is a result of the structure of the polymer, that is, its lack of chemical unsaturation, the preeminent position of modern synthetic rubber with respect to deterioration is the result of the development of antioxidants. Even with Butyl and Hypalon, antioxidants are normally added to produce products having the greatest resistance to attack.

Two fortuitous circumstances relating to

the use of antioxidants with synthetic rubber are worthy of mention. First, those general-purpose antioxidants developed for use with natural rubber have proved effective with synthetic rubbers. Second, the general-purpose antioxidants are even more effective in synthetic rubber than in natural rubber.

Unvulcanized natural rubber contains an antioxidant that is highly effective in protecting the gum, but this is destroyed during vulcanization and must be replaced. As for synthetic rubber, it was found early that without the presence of a protective agent the unvulcanized material rapidly oxidized to produce a hard resinous substance devoid of rubber-like properties. This condition was particularly true for those rubbers based on butadiene. Subsequently the general-purpose antioxidants such as phenyl-beta-naphthylamine and the ketone-diphenyl-amine reaction products were shown effective in eliminating this deterioration. On the other hand the rate of oxidation was accelerated in unvulcanized natural rubber with these additives.

Recent work has shown that some inconsistencies can result from attempts to evaluate the life expectancy of rubber products solely by means of accelerated aging tests. One investigation came to the conclusion that the presence of 1% of a general-purpose antioxidant, such as phenyl-beta-naphthylamine, in a GR-S tread stock will approximately double the life expectancy of that stock as measured by the air oven test at 100° C. Dinsmore and Fielding have compared the age resistance of a natural rubber tread stock and a GR-S tread stock, both of which were protected with phenyl-beta-naphthylamine, concluding that by either the air bomb test or the Geer oven test the GR-S stock was the more resistant to deterioration. Other work has confirmed this finding.

To date, however, no antiflexing antioxidant for synthetic rubber has been found as efficient as the special-purpose antiflex cracking antioxidants for natural rubber. But even in natural rubber these materials are more effective in preventing initiation of cracks than in preventing crack growth itself. With synthetic rubber, crack initiation is less important than crack growth.

As for neoprene, since it has been in use for more than 20 years, it is safer to correlate service life with accelerated aging tests than it is with GR-S and nitrile rubbers. Neoprene has established an outstanding record for being resistant to oxidative degradation. The efficiency of antioxidants in neoprene products has been a large contributing factor to this record. It has been demonstrated that the addition of an antioxidant to the neoprene stock results in much greater aging resistance than does a similar addition to stocks of natural rubber.

One of the outstanding achievements of the rubber industry was the rapidity with which it translated the theoretical work of Moureau and Dufraisse in the oxidation of acrolein into the development of commercially valuable antioxidants for use in practical rubber products. Their work was first published in 1922, and I hope my brief review of synthetic rubber antioxidants shows that the industry has been as alert in the 1940's as it was then.

Arthur M. Neal

General Antioxidants for Natural Rubber Products

G. C. Maassen
R. T. Vanderbilt Co.

G. C. Maassen

It is well known that natural rubber contains small proportions of naturally occurring materials that serve as antioxidants. In 1895, Henriques demonstrated that if these materials are removed by acetone extraction, the rubber exhibits an increased tendency to oxidize. The use of synthetic antioxidants probably began in 1906 when Oenslager discovered the organic accelerators, materials which theoretically meet the definition of an antioxidant. By 1932, antioxidants were being consumed at the annual rate of 4,000,000 pounds. That figure represented 0.5% of the consumption of rubber. Today the ratio has increased to 1-2%.

The antioxidants can be divided into the derivatives of phenols and the derivatives of aromatic amines. The phenol derivatives are slightly less discoloring and staining than the amines, but for the most part the amines are stronger antioxidants. Naphthylamines such as phenyl-beta-naphthylamine and aldeo-alpha-naphthylamine are considered general antioxidants and are used for most general-purpose situations, as long as the dynamic characteristics, staining, and discoloration properties are not taken into consideration. Then there are alkylated diphenyl amines, which are also used for general purposes and are slightly less staining.

For flex life are offered such materials as the reaction products of acetone and diphenylamines, as well as combinations of naphthylamines and diphenyl-paraphenylene-diamines The diphenyl-paraphenylene-diamine is a very good material for improving the flex life of rubber articles. Its use, however, is limited because excessive blooming occurs when quantities above 3% are employed. It is also known that it is needed to protect against copper and manganese deterioration. It is thought that the copper and the manganese serve as catalysts for the oxidation reaction, and such a material needs to serve the dual function of deactivating copper and manganese and acting as an antioxidant. Materials such as dibeta-naphthyl-phenyldiamine and disalicyl-propylene-diamines, in combination with other antioxidants, have been found valuable in this respect.

For heat resistance there are materials such as the alkylated polymerized dihydro quinolines and, when a minimum of staining and discoloration is required, the alky-

D. E. Baker

lated hindered phenols. For resistance to ozone attack antioxidants used in quantities greater than those normally employed for antioxidant purposes have been found moderately valuable. Many materials deemed practical for ozone protection are too toxic for general use.

Time does not permit me to go into a full dissertation on antioxidants, and I do not mean to infer that only the materials mentioned are suitable for the testing conditions described.

Antiozonants

D. E. Baker
Monsanto Chemical Co.

It is now generally accepted that cracking in rubber is caused primarily by the action of ozone and not from such things as poor compounds, excessive flexing, sunshine, and heat, as previously believed. The concentration of ozone is today higher than at any previous time for which records are obtainable. This concentration varies seasonally and sectionally, with rubber showing the most deterioration during spring and summer.

We have attempted to reduce or eliminate much of this cracking by adding various waxes, oils, and antioxidants. The success of this method has depended on the application of the item and the locality in which it is used. Within the last ten years antiozonants have been developed which do materially reduce cracking caused by ozone.

The term antiozonant is preferable to antiozidant for this class of materials in order to prevent confusing the term with antioxidant, which has no general basis. The dosages of these antiozonants will vary with the compound and severity of service, but usually a level of 2% is thought fairly safe for protection.


Montanari Studio
I. E. Cutting


A. R. Davis

Non-Staining Antioxidants for Dry Compounded and Latex Products

A. R. Davis
American Cyanamid Co.

The term non-staining is used to describe those antioxidants which impart no color to the rubber product and do not themselves develop color on exposure to light or other aging conditions. White or light-colored rubber products in general develop some discoloration in the absence of an antioxidant. The degree of discoloration depends upon such factors as the type of rubber, ratio of sulfur, type of acceleration, and type of softeners, plasticizers, filler, and reinforcing pigment. A non-staining antioxidant must, therefore, develop little or no color above that normally caused by aging or use of the rubber product.

The best non-staining antioxidants belong to the class of chemicals known as phenols. Typical phenolic type antioxidants follow: p-phenylphenol (Parazone[1]), giving only fair protection in ratios of 0.5-1.0% during normal aging, and slight discoloration under sunlight; monobenzyl ether of hydroquinone (AgeRite Alba[2]), giving moderate protection against oxidation, flexing, and frosting at ratios of 0.25-1.0%, and some discoloration in white rubber under sunlight; 2,6-ditertiary-butyl-4-methylphenol (DBC, Ionol[3], Deenax[4]), giving mild protection against oxidation in ratios of 1.0-2.0%, and practically no discoloration on exposure to sunlight; styrene-phenol reaction products (AgeRite Spar,[2] Styphen I,[5] Wing-Stay-S[6]), giving mild protection against oxidation in ratios of 1.0-2.0%, and practically no discoloration under sunlight; 2,2′-methylene bis (4-methyl-6-tert. butylphenol), (Antioxidant 2246[7]), giving very good protection against oxidation in ratios of 0.25-2.0%, slight discoloring under light, and protection against flexing and surface oxidation; 2,2′-methylene bis (4-ethyl-6-tert. butylphenol), (Antioxidant 425[7]), giving very good protection against oxidation in ratios of 0.25-2.0%, and practically no discoloration at exposure to sunlight; 4,4′-butylidene bis (3-methyl-6-tert. butylphenol), (Santowhite Powder[8]), giving very good protection against oxidation in ratios of 1.0-2.0%, and very slight discoloration on exposure; and, finally, 4,4′-thio bis (3-methyl-6-tert. butylphenol), (Santowhite Crystals[8]), giving very good protection against oxidation in ratios of 1.0-2.0%, and only a small amount of discoloration on exposure to sunlight.

[1] E. I. du Pont de Nemours & Co., Inc., elastomers division.
[2] R. T. Vanderbilt Co.
[3] Shell Chemical Corp.
[4] Enjay Co.
[5] Dow Chemical Co.
[6] Goodyear Tire & Rubber Co., chemical division.
[7] American Cyanamid Co., intermediate and rubber chemicals department.
[8] Monsanto Chemical Co., Rubber Service Department.

Waxes

I. E. Cutting
Naugatuck Chemical Division

Ozone attacks the polymer molecule of the double bonds to form ozonide. The rubber must be under stress before ozone cracking will take place. These stresses are present in all vulcanized articles. There appears to be a critical point for every rubber compound, but it is usually in the range of 10-50% elongation. Below this critical point the cracks become smaller and rather deep. Above the critical point the cracks become smaller and more numerous. Ozone cracking does not require sunlight and will take place in the dark as well.

Several chemicals are available to combat ozone cracking, both static and dynamic, but they can be used only in black stocks as they cause discoloration and lacquer staining.

In addition, waxes are widely used for this purpose, since they will exude and form a protective surface film. The film should be sufficiently flexible, thin enough so that it will not flake off, and fluid enough for it to rise to the surface and replace any worn-out section of the film. Too-low melting waxes may be reabsorbed into the rubber during summer temperatures. High-melting waxes offer good protection in summer, but winter temperatures lessen the migration rate and impair their effectiveness.

In conjunction with an antiozonant, waxes are especially suitable for certain types of dynamic service. The waxes inhibit static cracking; while the antiozonants augment this effect and also protect during flexing of the rubber. The blend of wax needed depends upon the season and locality, as well as the type of polymer and kind of compounding ingredients employed. Fillers, for example, absorb wax and dictate the use of a higher percentage of wax, up to 20% in some cases.

The solubility of waxes in different polymers varies. GR-S type of rubber absorbs larger amounts than natural rubber; while in the nitrile rubbers and the chloroprenes, the lower melting point blends have been found more effective than the higher melting point blends. For Butyl rubber the medium-range melting point blends are recommended.

Frosting, which has the appearance of a white bloom, is another effect from ozone exposure and is prevalent during the warmer seasons under conditions of high humidity. Protection from frosting can be blended into a mixture of waxes by proper choice of ingredients. The amount of wax used to prevent frosting is usually less than that required for protecting against ozone cracking.

(To be concluded)

SAE Meeting Papers on Tires

Among the papers presented at the Golden Anniversary summer meeting of the Society of Automotive Engineers held in Atlantic City, N. J., June 12-17, were several on tire and tire developments.

"Operation of Passenger Tires at High Speeds" was presented by E. H. Wallace and S. A. Lippmann, of United States Rubber Co. These authors first pointed out that progress in tire manufacture had increased passenger-car tread mileage steadily until the national average in 1954 was almost 30,000 miles. In addition, the danger of blowouts has been minimized, skid and traction qualities improved, and reliability against "flats" from punctures improved by the move to tubeless construction.

Complacency, however, is not in order, for driving at high speeds is becoming more prevalent. At a sustained speed of 100 mph., the standard tire at normal inflation and load will fail in about 50 miles. This same tire does not fail in continuous operation at 94 mph.

Power consumed by a standard tire in the range from 0 to 100 mph. varies in straight-line relation up to about 50 mph.; at higher speeds, more than linearly. The point at which the curve departs from linear behavior is called the critical speed. The relation of inflation, tread weight and design, and cord angle of passenger-car tires to critical speed and means of obtaining improved operation at high speeds were discussed, and it was concluded that large-scale improvements in high-speed operation, for the present at least, appear to be limited to constructional changes alone.

"Practical Tire Research" was the title of a paper presented by V. E. Gough, Dunlop Rubber Co., Ltd., England. This author dealt with studies of the distribution force and movement within the tire-ground contact as the tire operates at a slip angle, studies of buffing patterns observed on worn treads, a new method of presenting the cornering properties of tires and its application, and a picture of a traction or standing wave in a tire on a flat road high speed.

"Tires for High Performance Cars" by T. J. P. Joy, D. C. Hartley, and D. M. Turner, Avon India Rubber Co., Ltd., also of England, included the comment that successful tire design is a matter of compromise. High speed characteristics, for example, may be obtained by low crown angles, stiff undertread constructions, or high inflation pressures, but at sacrifice of riding comfort. Also, operation under wet road conditions makes necessary major emphasis on tread designs and improvements in such designs to provide for better wet-road operating performance which, however, in turn increases tire noise.

"The New Drop Center Tubeless Truck Tire," by T. A. Robertson and R. P. Powers, Firestone Tire & Rubber Co., explained this method of mounting tubeless tires on trucks; while **"A Universal Program for Tubeless Truck Tires,"** by C. R. Case, Goodyear Tire & Rubber Co., gave details of the Tru-Seal program employing truck rims of more than one piece with a rubber seal between the rim parts, as offered by The Goodyear Tire & Rubber Co.

Elastomer and Plastics Group Holds Short-Talk Symposium

The Annual Short Talks Symposium of the Elastomer & Plastics Group, Northeastern Section, American Chemical Society, was held at Massachusetts Institute of Technology, Cambridge, Mass., May 17, with William H. Crandall, Frederick S. Bacon Laboratories, presiding. Fifty-five members and guests attended.

The five speakers and their subjects included Ernst A. Hauser, MIT, "The Morphology of Elastic Silicones"; Kenneth A. Loftman, Godfrey L. Cabot, Inc., "General Characteristics of Synthetic Silicas"; Irving Pockel, Cambridge Industries, Inc., "Special Polyesters"; Martin E. Conroy, M. W. Kellogg Co., "Kel-F Elastomers"; and Richard S. Cass, Bacon Laboratories, "The Determination of Plasticizer Vapor Pressure."

Dr. Hauser demonstrated how the physical condition of elastomeric films cast on screens by evaporation of solvents could be interpreted as an indication of the molecular weight distribution of the elastomer. The silicone rubbers he described exhibited the filament-and-globule structure characteristic of natural rubber. Mixtures of silicone rubber with natural rubber or Butyl, he said, could be vulcanized and would then show tensile strengths up to 4,800 psi.

Mr. Loftman described the 22 grades of synthetic silicas available from the seven American producers engaged in this work. These silicas are produced in both liquid phase and vapor phase; each class of material is further subdivided into untreated, aqueous dispersion, and surface-treated subclasses. The properties and applications of each group were outlined, including the use of vapor phase silica for improving Butyl wire stock by substituting 10 parts of the silica for 50 of the 150 parts of clay ordinarily employed.

Mr. Pockel discussed the common monomers and their polymers in terms of plasticizer needs and dealt with the dibasic acids and glycols now commercially available as sources of material for completely polymerized, liquid plastcizers. He described the investigation that led to the discovery of adipic acid-diethylene glycol as the only satisfactory plasticizer of this type for polyvinyl acetate and concluded with an outline of the plasticizers suitable for polyvinyl chloride and polyvinyl alcohol.

Mr. Conroy listed the advantages of Kel-F elastomer, including excellent resistance to peroxides and corrosive fuming acids, thermal stability, resistance to abrasion, low water absorption, good electrical properties, and a wide compounding compatibility. Compounding, curing, processing, methods of fabrication, and evaluation of vulcanizates and products were also described. This fluorocarbon rubber will be available semi-commercially in September, 1955, selling at $25 a pound, it was revealed.

Mr. Cass discussed the three methods for vapor pressure determination: namely, the static method, the boiling-point method, and the gas saturation method. He described the equipment he had devised to measure vapor pressure by gas saturation. This technique consists of passing a dry stream of nitrogen at constant rate and temperature through a 30-cc. sample of plasticizer contained in a glass bead-filled scrubber, from there into a heater, and finally through a weighing trap in a dry ice-cooled Dewar flask.

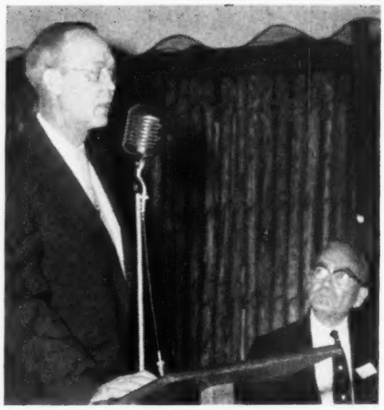
Thiokol Club Hears Fuller

Calvin S. Fuller, Bell Telephone Laboratories, delivered an address on Bell's solar battery before the Thiokol Technical Club, meeting under an outdoor canopy on the grounds of Thiokol Chemical Corp., Trenton, N. J., May 25. More than 200 guests and company employes were on hand for the evening's activities, which also included a social hour and dinner.

Assisted by B. S. Biggs, also of Bell, Dr. Fuller demonstrated the capabilities of the solar battery and outlined its development and potentialities. Essentially

consisting of silicon plates of near-absolute chemical purity, the batteries convert light into electricity by means of electron transference.

Operating at about 6% efficiency, poor compared to that of other power sources, Dr. Fuller admitted, the batteries are nevertheless eventually expected to find practical application in a number of fields. Bell, for example, is currently experimenting with their use as voltage boosters for isolated sections of telephone lines. Principal advantages of the battery are its small size and extremely long service.



Calvin S. Fuller discussing Bell Labs' solar battery before the Thiokol Technical Club. J. M. Ball, Midwest Rubber Reclaiming Co., listens at right

Rubber Library Procedure Manual Planned

The operating subcommittee of the Rubber Division, A. C. S., Library at the University of Akron, Akron, O., is preparing a manual of procedures for rubber libraries. This manual, which will be made available through the Rubber Division Library, will include chapters on basic library routines such as book selection and order work, classification and cataloging, reference and other information services. There will be an annotated bibliography of basic books and journals, and of technical data series available from various companies and government sources.

The committee would welcome suggestions as to specific needs which should be met. It would also appreciate knowing of reference materials which have proved useful in various rubber companies and descriptions of procedure which have been worked out for specific problems within the industry.

Ideas and suggestions may be sent to the Rubber Division Library, University of Akron, Akron 4, O., or to Miss Lois Brock, librarian, The General Tire & Rubber Co., Akron 9, O.

"Data Filing" at Tlargi; Group on "Shore Leave"

"Filing Compounding Information and Finding It" was the subject of an address by Kathleen S. Rostler, chemist and editor of "The Rubber Formulary," before The Los Angeles Rubber Group, Inc., at the Hotel Statler, Los Angeles, Calif., May 3. Mrs. Rostler described the various methods of recording compounding data by means of marginally punched cards. The evening's dinner-meeting sponsored by The Goodyear Tire & Rubber Co., featured a program of entertainment arranged by Bob Meany and a drawing for nine prizes.

The organization's annual summer outing, held at Hotel del Coronado, San Diego, Calif., June 4 and 5, was dubbed "Shore Leave" and had 275 members and guests in attendance. General chairman of the event was Carl Hoglund, R. D. Abbott Co., Inc., who was assisted by John Arensmeyer, Ratliff Rubber Co.; Glen Lucas and Dick Wells, both of Firestone Tire & Rubber Co.; Andy Mitchell, E. I. du Pont de Nemours & Co., Inc.; John Arensmeyer, Ratliff Rubber; Don Montgomery, Xylos Rubber Co.; Mac MacDonald, Midwest Rubber Reclaiming Co.; and Bob Roby, Accurate Products Co.

Bugbee Says Research Will Boost Natural Rubber Use

H. C. Bugbee, president, Natural Rubber Bureau, in a talk before the Washington Rubber Group at the Pepco Auditorium, Washington, D. C., May 8, stressed the necessity of natural rubber research if that material is to meet the vigorous competition of synthetic rubber. A film, "Rubber in Roads," was also shown.

Pointing out that research has been the cornerstone of the remarkable progress of synthetic rubber, Bugbee said that natural rubber is in a similar position, depending for its future on the uses and new products that research now being carried out will make possible.

"Natural research begins with the head start nature has already given it," he said.

The speaker affirmed his faith in the future of natural rubber, believing that the world economy for the next decade will consume all the rubber that can be produced, both natural and synthetic. Natural rubber producers all over the world, he said, also believe in the material's future and are replanting heavily.

Citing examples of the progress natural rubber research is making, Mr. Bugbee mentioned seeing in London samples in which the non-rubber constituents of latex had been isolated into a stable, solid state through new high-speed centrifuge and freeze-drying techniques.

Other important developments, he observed, included tear- and abrasion-resistant rubber, low-temperature rubbers that will remain serviceable even when cooled rapidly to as low as — 80° C., and cyclized rubber that made an ideal substitute for leather soling. On the Continent, he saw tires that were colored throughout, including the tread, as opposed to this country where only colored sidewalls have been attempted.

Describing the Natural Rubber Bureau's promotion of rubber in roads, Mr. Bugbee said that his organization had started the program in 1949 and had already laid down 71 test stretches of rubberized road in 27 states and in five Canadian provinces.

Rubber Division Best Paper Award to Rugg and Scott

The Division of Rubber Chemistry, American Chemical Society, at its last meeting in Detroit, Mich., May 4-6, instituted a "Best Paper Award," by which the papers presented before its meetings were judged on: (1) technical importance of subject matter; (2) quality of oral presentation; (3) quality of the visual presentation.

A committee of reviewers from the Division selected the paper, "Adiprene B Urethane Rubber—II—Factors Influencing Its Processability," by J. S. Rugg and G. W. Scott, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., as the best paper given at the above-mentioned meeting.

Mr. Rugg is a chemist at Du Pont's elastomers division rubber laboratory, Deepwater, N. J. He is a native of Denver, Colo., and received his B.S. degree from the University of Denver in 1943. He was employed by Gates Rubber Co. from 1943 until 1952, when he joined Du Pont, where he has been doing research and development work on tires and new synthetic rubbers. He has made several prior contributions to the technical literature on rubber.

Dr. Scott was born in Cape Charles, Va. He was graduated from William & Mary College with a B.S. degree in 1938, and obtained his M.S. and then (in 1942) a Ph.D. degree from the University of Virginia. He has been doing research on organic chemicals, dyestuffs, petroleum chemicals, and elastomers with Du Pont since 1942. In May, 1955, he was transferred to the Louisville Works, Louisville, Ky., where he is engaged in applied research on neoprene production. Dr. Scott is a member of Phi Beta Kappa and Alpha Chi Sigma honor fraternities.

Conn. Group Hears Pike

An illustrated lecture on Far Eastern rubber plantations was given by Sidney J. Pike, president of S. J. Pike & Co., Inc., New York, N. Y., natural rubber importer, before the Connecticut Rubber Group, meeting at the Actors Colony, Seymour, Conn., May 20. The talk was based on Mr. Pike's last Asiatic trip to such rubber producing areas as Indo-China, Malaya, Java, Sumatra, and Ceylon and outlined the growing, tapping, preparation, packing, and shipping of rubber. Colored slides accompanied the discussion.

High Attendance at Canadian-American Rubber Meetings

The annual conference of the Rubber Division, Chemical Institute of Canada, held at the Sheraton-Brock Hotel, Niagara Falls, Ont., had a record registration of 200 Americans and Canadians; while some 300 attended the regular joint meeting of the Buffalo Rubber Group and the Ontario Rubber Section, CIC, in the hotel later that day. The CIC's Rubber Division luncheon had 168 present.

The Rubber Division's morning technical session featured eight papers and was presided over by F. R. Gorrie, Cabot Carbon of Canada, Ltd., and chairman of the Division. Garnet T. Page, general manager of the CIC, delivered the chief address at the luncheon, which outlined the organization's functions.

The eight technical papers, abstracts of which were published in the April, 1955, issue of RUBBER WORLD, were as follows:

"Polyurethane Products," by H. H. Abernathy, elastomers division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

"Growth and Agglomeration of Particles in Low-Temperature GR-S Latex," by R. W. Brown and L. H. Howland, Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. (See page 471, this issue.)

"Rubber and Related Material Applications in Wire and Cable Manufacture," by George C. Winspear, R. T. Vanderbilt Co., New York, N. Y.

"Effect of Temperature on Tire Yarn and Cord Properties," by J. W. Illingworth and W. F. Kilby, Dunlop Research Center, Birmingham, England.

"Industrial Research and Development Techniques," by B. M. G. Zwicker, B. F. Goodrich Chemical Co., Cleveland, O.

"Elastomeric Foams," by T. H. Rogers, The Goodyear Tire & Rubber Co., Akron, O.

"Nitrile Rubber in Polyvinyl Chloride Conveyor Belts," by D. Hay, H. A. Pfisterer, and E. B. Storey, Polymer Corp., Ltd., Sarnia, Ont.

"The Identification of Elastomers by Infrared Spectroscopy," by W. H. T. Davison, Dunlop Research Center.

Officers elected during the Rubber Division's business session included: chairman, Gordon Baxter, Firestone Tire & Rubber Co. of Canada, Ltd.; vice chairman, O. R. Huggenberger, Dominion Rubber Co., Ltd.; secretary-treasurer, H. K. Cunliffe, Barrie Rubber Co.; and executive committee, J. A. Carr, Canadian Dunlop; E. J. Gibbon, C.I.L. (1954), Ltd., and L. F. Huhta, Goodyear Tire & Rubber Co. of Canada, Ltd. Tom Davies, Polymer Corp., chairman of the nominating committee, presented the slate.

A motion put forward by Carl Croakman, Binney & Smith, to the effect that the chairman of the Ontario Rubber Section, CIC, be made an ex-officio member of the executive committee of the Rubber Division and that the vice chairman of the Ontario Rubber Section be made a permanent appointee to the committee was voted on and approved.

J. G. Dolan, chairman of the Quebec Rubber & Plastics Group, presided over the afternoon joint session. W. J. Nichol, Canadian Dunlop, introduced the after-dinner speaker, M. E. Lerner, editor of *Rubber Age*, whose subject was "Some General Observations on the European Rubber Manufacturing Industry," based on his tour of 36 rubber factories and laboratories in nine European countries last summer.

Members and guests on the dais included C. E. Johnson, Hewitt-Robins, Inc., chairman of the Buffalo Rubber Group; E. R. Rowzee, Polymer Corp., president of the Chemical Institute of Canada; A. M. Neal, du Pont, secretary of the Division of Rubber Chemistry, A. C. S.; M. Studebaker, Phillips Chemical Co., chairman of the liaison committee of the Rubber Division, A. C. S.; and Mr. Page.

Groups Hold Outings

Rhode Island Club Tees Off

A new attendance record was set despite drizzle and drab skies when 272 members and guests appeared for the annual outing of the Rhode Island Rubber Group at the Pawtucket Country Club, Pawtucket, R. I., June 2. Golf and door prizes were contributed by 114 companies.

Golf winners included the following: low gross, F. Newman, Respro, Inc., and J. Christopher, guest, tied for first, with Tom Joy, Gulf Oil Co., third; low net, E. Parent, Bestread Products, L. V. Sarni, Griswold Rubber Co., and H. William Cook, B. F. Goodrich Chemical Co.; blind bogey winners, G. Ritchie, United States Rubber Co., L. Rossiter, Napco Chemical Co., and R. Szulik, Acushnet Process Co.

Also, nearest to the pin, L. Yates, Atlantic Paper & Twine Co., B. Mulligan, J. U. Starkweather Co., and Tom Joy; most 6's, Gordon White, Davol Rubber Co.; most 7's, J. Mazza, United States Rubber Co.; most 8's, R. Rowe, Sharples Chemical Co.; high gross, J. Martin, Goodrich Chemical; high net, R. Rowe; longest drive, F. Newman; and putting, S. H. Tinsley, R. T. Vanderbilt Co., and F. Langhorst, Stanley Chemical Co.

Record Crowd for Boston Group

The most populous outing in the history of the Boston Rubber Group was held at the Andover Country Club, Andover, Mass., June 17, with 560 members in attendance, in addition to guests. Heading the outing committee was David W. Kirkpatrick, Chase-Walton Elastomers, Inc., and John Breen, Barrett & Breen Co., was director of the golf tournament.

Top golf prizes were won by Philip Blanchard, T. C. Ashley Co., low net; A. Nelson, Hood Rubber Co., low gross; Harold Leach, Goodall-Sanford, Inc., kicker's handicap; D. Larson, Haartz-Mason Co., nearest to pin; and Leo Belliveau, Converse Rubber Co., putting. The traditional high net and high gross awards were garnered by L. Lord, Columbia-Southern Chemical Division, and P. Keohane, Avon Sole Co., respectively. W. K. Priestley, United States Rubber Co., won the drawing for a set of three Sam Snead golf clubs. Thirty-eight other prizes were distributed.

New York Group Attendance 185

The New York Rubber Group held its annual outing at Doerr's Grove, Millburn, N. J., June 9, with 185 members and guests putting in an appearance despite the fallen temperature and daylong drizzle. A variety of games and competitions continued throughout the afternoon, and dinner was followed by the awarding of prizes.

Winners included A. M. Gessler, Standard Oil Development Co., captain of the winning soft ball team; M. F. Malkiewicz, Raybestos-Manhattan, Inc., captain of the winning volley ball team; William Lamela, Okonite Co., and M. R. Buffington, Lea Fabrics, Inc., first and second in the horseshoe contest; P. Calvin Fuller, Raybestos-Manhattan, and W. M. Meeker, Pequanoc Rubber Co., top boccie team; M. R. Buffington, golf drive; Richard P. Ebersbach, American Hard Rubber Co., baseball throw; and B. D. Allen, Stauffer Chemical Co., basketball throw.

Prizes were distributed by B. Brittain Wilson, general manager, RUBBER WORLD. M. R. Buffington was outing chairman.

Fort Wayne Plays Golf

The Fort Wayne Rubber & Plastics Group held its fourth annual golf outing at the Tippecanoe Lake Country Club, Leesburg, Ind., June 10, with 210 members and guests present. Golf prizes, contributed by 82 rubber and supplier companies, were won by Frances Frost, Frost Rubber Works, low gross; Ed Hession, Mogul Rubber Co., low net; C. White, Toolcraft Industries, long drive; Al Robinson, Harwick Standard Chemical Co., second longest drive; Roy Marston, Binney & Smith, closest to pin; while F. Milward, Goodyear Chemical Co., outdistanced his competition with a high gross of 167. Seventeen other prizes were also awarded.

Chairman of the committee in charge of the outing was Walt Wilson, R. T. Vanderbilt Co.

Newly elected officers of the Group were reported as Jack L. Carlson, Paranite Wire & Cable Division of Essex Wire Corp., chairman; Maurice J. O'Connor, O'Connor & Co., vice chairman; and John Dixon, Jr., Anaconda Wire & Cable Co., secretary-treasurer.

Officers Elected by MCA

John R. Hoover, president, B. F. Goodrich Chemical Co., has been elected chairman of the board of directors of the Manufacturing Chemists' Association, Inc., succeeding Fred J. Emmerich, president, Allied Chemical & Dye Corp. William C. Foster was reelected president and a director, and William H. Ward, vice president, E. I. du Pont de Nemours & Co., Inc., was elected chairman of the executive committee.

Also named were Howard S. Bunn, vice

(Continued on page 513)

NEWS of the MONTH

Washington Report and National News Summary

In another report to the Congress in June, the Rubber Producing Facilities Disposal Commission claimed a total return of $415 million for sale of the synthetic rubber plants. This figure is about $10 million more than the total book value and operating deficit since the beginning of the government's program, but includes the cash balance held by the operating agency.

Transfer of the Baytown, Tex., GR-S plant to United Carbon Co. by mid-July seems assured. Bills have been introduced in both Houses of Congress for the sale of the Institute, W. Va., copolymer plant, but for non-rubber use.

Defense Department needs for new rubbers and plastics were outlined by John B. Macauley, Deputy Assistant Secretary of Defense for Research and Development, at a meeting of the Chemical Engineers Club of Washington in June.

The United States granted and received certain tariff concessions on rubber products from Japan, according to a State Department announcement of June 9.

The repeal of the quantity limit proviso of the Robinson-Patman Act has been recommended by a committee appointed by the U.S. Attorney General, but was opposed in hearings before the House Judiciary anti-trust subcommittee last month.

New figures for the degree of conformance with standards for natural rubber imports of the Rubber Manufacturers Association for 1954 were revealed at the Second International Rubber Quality and Packing Conference in New York in early May. Although there was some effort to lower RMA standards, no real changes were approved. About 35 representatives of natural rubber producing and consuming nations from abroad discussed natural rubber quality and packing improvement with U.S.A. representatives at this meeting.

New statistics for rubber production and use in 1954 and new estimates for 1955 have been reported in detail by the International Rubber Study Group.

The United Rubber Workers union has called for a pay increase and a discussion of a guaranteed annual wage this year, but industry management stated that the GAW cannot be discussed this year.

Washington Report

By ARTHUR J. KRAFT

Baytown Plant Transfer Probable in July; Institute Plant Non-Rubber Use Sale Proposed

The federal law under which the government sold its synthetic rubber plants had as a primary goal a selling price representing "full, fair value" to the nation's taxpayers. That was two years ago. Today, with the selling job successfully behind them, the government's salesmen can add a brief postscript. If "full, fair value" is what a willing buyer will pay a willing seller, it helps if there are plenty of willing buyers.

Disposal Commission's June Report

That, at least, is the lesson some will draw from the experience of the three-member Rubber Producing Facilities Disposal Commission, which sold the 25 synthetic rubber plants to private industry. By any definition they did well, receiving for the facilities alone $10 million more than the taxpayers put into them. Reporting to Congress in June, Chairman Holman D. Pettibone and his fellow commissioners claimed a total return of $415 million from the transfer of the plants. The 25 facilities themselves brought in $270,796,000; while the remaining $145 million represents payments by plant purchasers for inventories, spare parts, net additions to plants, and finished rubber, plus the return to the Treasury of the cash balance held by the government operating agency and other cash generated by the sale. In contrast, the net book value of all plants and other assets in the program was put at $128,088,000, and the government's operating deficit since the start of the program in World War II at $132,700,000, a total of $260,788,000. That's $10,008,000 less than the amount recovered in payment for the capital assets of the 25 plants, including the Baytown GR-S copolymer plant.

July Baytown Transfer Date

That a prevalence of eager bidders helped swell the Treasury's coffers was nowhere more evident than in the sales price of the Baytown plant. Nine bids were received when the bidding deadline came on April 29, the highest a $4,120,000 offer by Goodyear Synthetic Rubber Corp. The Commission regarded this as too low for a plant with a gross book value exceeding $10 million and told the bidders so in its memorandum of May 17. Moreover, the Commission didn't want to sell to Goodyear—since that firm already owned two synthetic rubber plants purchased earlier this year.

Mulling over the situation, the Commission in its May 17 "memo" told the eight other bidders that it would take no less than $4.8 million for the plant. At the

same time, it gave the eight remaining bidders seven days to appear at the Commission's offices each with a final offer in hand; the bidder coming in with the top figure on that date would get the plant. Goodyear, meanwhile, informed that it was out of the running, instantly withdrew from the race. The gamble with the eight others paid off, as all but two jacked up their original bids on May 25. The plant was sold that same afternoon to United Carbon Co., Charleston, W. Va., for $7,153,000.

All this and more was disclosed by the Commission in a 64-page report to Congress on June 13, recommending approval of the sale to United Carbon, the world's third largest carbon black producer. The firm actually will pay $8,644,000—including $1,491,000 for various inventories and net additions to the plant. The Attorney General has endorsed the sale as consistent with the anti-trust laws and likely to foster competition in the synthetic rubber industry. Probable transfer date is mid- or late July. It would take a veto resolution by either house of Congress by July 10 to block the sale, and not a peed of opposition to the sale had been heard in either chamber as of late June.

The Commission's report of June 13 made the first disclosure of prices offered by the various bidders for the Baytown GR-S plant. It also gave much information on what rubber consumers can expect of the plant's future operator, United Carbon.

The initial bids received April 29 follow (listed alphabetically): American Resinous Chemicals Corp., $3,680,000; Baytown Rubber & Chemical Co., $3,175,000; Food Machinery & Chemical Corp., $3,327,500; General Tire & Rubber Co., $2,739,236; Goodyear Synthetic Rubber Corp., $4,120,000; Minnesota Mining & Mfg. Co., $3,000,000; Edwin W. Pauley, $3,250,000; Thiokol Chemical Corp., $3,130,000 (withdrew as bidder morning of May 25); and United Carbon Co., $3,253,000.

United Carbon agreed in its contract to sell all its GR-S output available on the open market and sell at least 40% to small business firms at "fair prices." In its proposal, the firm said that while the Baytown plant has an assigned capacity of 44,000 tons, a "more realistic" figure for sustained production is 36,000 tons, and it probably won't be able to top 33,000 tons if, as expected, United Carbon is called upon to make a variety of polymers each used in small volume, an operation requiring "considerable downtime." The company said it has no intention of getting into the business of making rubber goods.

"United is fully cognizant of the fact that the masterbatch type of rubber produced in this plant is particularly suitable for use by small manufacturers. United has a wide acquaintanceship among small rubber manufacturers and would make a special effort to see that their requirements for synthetic rubber are met," the company's bid proposal said.

"United believes that its present carbon black sales arrangement is ideal for disposing of the end-products of this plant. United maintains its own sales offices in Boston, New York, Chicago, Akron, and Memphis and has sales agents in the principal cities of the United States, Canada, and Mexico and in all foreign countries. These sales representatives are in daily contact with manufacturers of rubber products in connection with the sales of carbon black, and their services would be available in disposing of the production from this plant.

"For some time United has been anxious to enlarge its activities and diversify its operations. The purchase (of the Baytown GR-S plant) offers an excellent opportunity for such diversification since the manufacture of synthetic rubber is not unrelated to its current activities, and in view of its background and present organization it has every reason to believe that it can become a strong and aggressive member of this expanding and important industry. . . . United is fully aware of the part which research and development will play in the future of synthetic rubber, and it is large enough, both from the standpoint of finances and its emphasis on research, to compete vigorously with the other members of the industry. In connection with the operation of this facility, United plans to pursue an aggressive research program, and as new or specialized types of synthetic rubber are developed, it expects to produce the same in this plant to the extent that market demand from time to time may warrant."

Tank Cars Left

If it gets by Congress, the Baytown sale will leave the Commission with only the sale of the government tank-car fleet to get out of the way before closing out the job which brought it into being nearly two years ago. Eleven firms submitted bids for some or all of the 446 pressure tank cars, and the Commission was still dickering with them in late June. None of the 11 has been identified by the Commission, although one—Food Machinery & Chemical Corp.—became known last month. In its bid proposal for the Baytown plant, this company also named $1,500 as the price it was willing to pay for each of 75 large-capacity (10,000 gallon) tank cars. Presumably, Food Machinery's offer is still alive.

Institute Plant Sale?

The Commission, however, may get yet another job. With the example of Baytown freshly before them, two West Virginia legislators introduced bills last month authorizing sale of the Institute, W. Va., GR-S copolymer plant. The Commission had tried, and failed, to find a buyer for this 122,000-ton "mothballed" giant last year, but private firms considered it a white elephant too costly to operate competitively with other GR-S plants. The bills now before Congress are not flying in the face of this stark reality. They propose sale of the plant for operation *other* than as a rubber producer. Both bills (S.2263 by Senator Kilgore and H.R.6883 by Representative Byrd) specifically require that "the contract of sale and the instruments in execution thereof shall contain provisions that will insure that such facility will not be used for the production of synthetic rubber." The contract also would dispense with the national security clause, required of buyers of the other synthetic rubber plants. The bills do not require Congressional review of the proposed sale—another departure from form.

What they do require is that the Commission, or a successor agency, solicit bids for the plant and sell to the highest bidder, subject only to the requirement that the plant not be used to make rubber. That leaves the way open to sale at a low price without jeopardizing the competitive position of those who paid "full, fair value" for the 12 other GR-S plants.

Behind the bill is the desire of the West Virginia legislators to get the plant back into business to provide employment in that area of high, chronic unemployment, as well as the desire of Union Carbide & Carbon Co. to find new factory space to expand its chemicals operations in the same area. Union Carbide operates a complex of industrial plants adjacent to Institute and reportedly has cast an eye on the idle government rubber plant as a potential alternative to building a new plant to satisfy its expansion requirements. If the bill goes through, and the plant is sold, the rubber-making equipment would be removed to make way for other equipment to make other products.

At the moment neither the House Armed Services nor the Senate Banking committee has scheduled action on the Kilgore-Byrd bill, nor have they solicited opinions from the executive agencies. One possible roadblock: reluctance of defense authorities — including certain Congressmen — to dismantling a large rubber-producing plant which might have to be reactivated in event of national emergency. B. F. Goodrich Chemical Co. is standby contractor, and the annual cost of maintaining this plant in standby reserve—ready to resume GR-S production on 120-day notice—is $240,000.

Defense Department Rubber and Plastics Needs

The need of our Armed Forces for specialty rubber products which will be usable at higher temperatures than today's materials has been labeled "urgent" by John B. Macauley, the Deputy Assistant Secretary of Defense for Research and Development.

The defense official made the statement in a recent talk to the Chemical Engineers Club of Washington. Rubbers which will outperform existing types are needed particularly for extremely high-temperature operation of high-speed aircraft and missiles, Dr. Macauley said.

"We would like to have a synthetic rubber for heavy truck tires which would eliminate our dependence on natural rubber." Because of the excess heat generated by present synthetics, "many types of large sized tires have as much as 30% natural rubber in them, and some have more."

Macauley also pointed out that the Defense Department "has relied very extensively for fundamental rubber research" on the program carried on by the RFC and its successor as manager of the synthetic rubber plants, the FFC. With the plants now in private ownership, sponsorship of the research program appears headed for

the National Science Foundation. The Disposal Commission recommended in its report to Congress last January that NSF take over the FFC research program, and "it is my understanding," Dr. Macauley said, "that the Science Foundation plans to carry out this recommendation.

"Because of the seriousness of our need of better rubber for service in the extreme environments encountered in military equipment, and the pending changes in the status of the government research program, we requested, about a year ago, the Materials Advisory Board of the National Research Council to review the needs of the Department of Defense for rubber research, and to recommend any action needed to obtain reasonable solutions to the problems. The report, completed around the first of the year, recommended a considerably enlarged program, as necessary to achieve our research objectives within a reasonable time."

Dr. Macauley also reported that "there is a considerable field for the application of plastics in military equipment." The types most used, he said, are reinforced plastics, usually with a polyester resin and low fibers for the reinforcement, as well as lightweight transparent plastics for airplane canopies.

"Reinforced plastics have a wide range of use in such items as assault boats and sleds where their light weight and resistance to deterioration are their chief advantages. Since these uses are similar to corresponding civilian applications, it has been possible to use basic materials developed by industry. The military effort has been mainly confined to fabrication and evaluation of equipment, using commercially available materials.

"There is another application of this type of material where the products of industry, now available, do not seem capable of achieving the full possibilities of the material. This is the field of aircraft where it is always necessary, in the interest of low weight, to get the best out of each material used. The difficulty with reinforced plastics for aircraft use is the wide variation in properties—especially strength —which results from non-uniformity in the basic raw materials and in fabricating processes, and from the effects of environment — particularly moisture. A further problem," Dr. Macauley said, "is the lack of suitable non-destructive inspection techniques for finished components. We are at the present time developing plans for attacking these problems through research and development on a broader scale."

FFC Rubber Personnel Departures

With the government's synthetic rubber industry almost completely turned over to private ownership, the management team which had run the program over the past few years dispersed, leaving Washington for employment elsewhere. In nearly every case, that "elsewhere" was private industry and, generally, a return to a job left many months before to serve a hitch in public service. In bidding farewell to Washington, the management team of the Federal Facilities Corp., Office of Synthetic Rubber, was underscoring a basic fact making for the great success of the synthetic rubber program. That fact was the joining together of government and private industry to create and staff the program. From the start, the government had borrowed heavily from private rubber, oil, and chemical firms in putting together a succession of top executive groups to run Washington headquarters.

No better evidence is available than the following list of officials who have doffed their government hats in the past few weeks in exchange for jobs with private industry. These most recent FFC "alumni" are listed here alphabetically. Following each name is the position last held with FFC, the employe's former affiliation, and his present affiliation. When the former and present affiliation are identical, the symbol "iden." is used. The list follows:

Robert M. Clibourn, research scientist, Goodyear Synthetic Rubber Corp., Goodyear Atomic Corp.; Raymond A. Dreselly, technologist, Humble Oil & Refining Co., iden.; Harry M. Goodman, technologist, Firestone Tire & Rubber Co., iden.; Edwin B. Hansen, Jr., technologist, United States Rubber Co., iden.; Arthur L. Hollis, technologist, B. F. Goodrich Chemical Co., R. T. Vanderbilt Co.; Ralph E. Hoy, technologist, U. S. Rubber, Enjay Co.; Lloyd Keating, chief, latex sales, U. S. Government, J. G. Milligan Co.; Wm. A. Maddox, technologist, B. F. Goodrich Chemical Co., iden.; Haller H. Meyers, consultant, Shell Chemical Corp., iden.; Samuel D. Morgan, production specialist (sales director), Goodrich Chemical Co., iden.; Charles A. Rew, technologist, Cities Service Co., iden.; Henry R. Rossen, technologist, Sinclair Research Labs., iden.; Ed. Stauverman, Jr., field safety engineer, Esso Standard Oil Co., Standard Oil Co. of Indiana; Charles L. Swanson, industrial engineer, Goodyear Synthetic Rubber Corp., iden.; Raddie M. Wallace, technical consultant (chief, Plant Operations), Phillips Chemical Co., iden.

U. S.-Japan Tariff Changes

The United States granted and received tariff concessions on rubber and rubber products in negotiations with 16 other nations aimed at bringing Japan into the General Agreement on Tariffs and Trade (GATT). Results of the Geneva negotiations, made public by the State Department at their conclusion June 9, showed these concessions of major interest to the rubber industry:

Japanese Concessions

Concessions made by Japan on imports from the U. S.—

The duty on pneumatic automobile tires was reduced from 30 to 25% ad valorem. Japanese imports of this product amounted to $61,000 in 1953. Duties on several other products were bound to existing statutory levels. While duty binding neither increases nor decreases the tariff rate, the State Department insists on regarding such action as "concessions." Synthetic rubber, with imports by Japan valued at $1,407,000 in 1953, was the largest of the rubber items bound. It was bound duty free—no tariff applying at all. The two other items, with an import volume of $255,000, were rubber pastes and solutions of rubber, bound at 5%, and rubber sealing compounds, bound at 15%.

Bindings of the statutory rates also were obtained from Japan for imports of two pigments, titanium oxide and carbon black, the former at 15% and the latter at 20%. Japanese imports of these items in 1953 were valued at $2,242,000, double the amount imported in 1951. Japan has substantial domestic production of both titanium oxide and carbon black; so her willingness to consent to a freezing of present import duties on these items represents a substantial concession to U. S. exporters. Production of carbon black in particular has increased considerably in the postwar years.

U.S.A. Concessions

In all such negotiations, concessions are reciprocal. The U. S., for its part, granted important reductions in duties on Japanese rubber boots and shoes, druggists' sundries of soft rubber and certain other soft rubber goods, rubber toys, toy balloons, rubber balls, and rubber-soled footwear with fabric and fiber uppers.

The concession on rubber boots and shoes amounted to a reduction in the tariff rate of $1.50 per dozen pairs. The former rate ranging from a maximum of 25% to a minimum of 12.5% (based on American selling price) was changed to a flat 12.5%. The rate applies to articles valued at not more than $12 per dozen pairs.

"The United States," the State Department commented, in explanation, "is the world's largest producer of rubber footwear. About 15 companies comprise the domestic industry. Production was estimated at around 30 million pairs, probably valued at about $100 million in 1953.

"Imports amounted to slightly less than 2% of domestic production in 1953, and a substantial part of imports have consisted of articles not competitive with the types of footwear produced in the United States. Japan has been the principal supplier of rubber footwear in recent years. The United States exports the better grades of rubber footwear, and although it is a net importer of this item by quantity, it is usually a net exporter by value."

U. S. imports were valued at $470,000 in 1953.

The concessions granted on other soft rubber manufactures amounted to a reduction in the rate of duty from 25 to 12.5%. This group of items, imports of which were valued at $1,865,000 in 1953, includes certain tires, druggists' sundries, and a miscellany of items not covered specifically in other tariff schedule classifications. The reduction on imported rubber toys from Japan was from 50 to 35%; rubber balls (including footballs, but excluding golf and tennis balls), from 30 to 20%; and toy balloons, from 70 to 35%.

The U. S. tariff rate on rubber-soled footwear with fabric and fiber uppers was reduced from 35 to 20% based on American selling price. Total U. S. imports of

these articles (from all sources) in 1953 was a modest $37,000.

The U. S. negotiators were forced to make compensatory concessions to the Netherlands as a result of Public Law 479 of the 83rd Congress, a law plugging a loophole under which certain foreign manufacturers were shipping in rubber-soled footwear with leather fillers or midsoles to qualify them for the lower import duty prevailing for leather footwear.

P. L. 479 provided that any footwear of which a major portion of the wearing surface area of the outer sole is composed of rubber was to be regarded as having soles wholly or chiefly of rubber. The law, effective this past January, made such items dutiable at 35%, based on American selling price. Until then, such shoes which contained a liberal amount of leather along with rubber in the sole, had been dutiable at only 20%—the duty applying to leather footwear.

The 20% duty on leather footwear was bound at a prior GATT meeting against an increase; so P. L. 479 was in conflict with this concession by the U. S. The Netherlands, claiming compensation, won from the U. S. negotiators concessions on eggs and fishing nets and netting.

The concessions negotiated with Japan will become effective September 10, 1955, if by August two-thirds of the GATT countries approve her entry into the organization. Japan's membership application will be voted on by mail ballot of the 17 member nations. At the negotiations, Japanese officials gave assurances of further concessions to U. S. imports in future years and pledged to keep her wage rates to "fair levels."

Quantity Limit Rule Repeal Opposed

A recommendation by a group of outstanding experts in the anti-trust law field that Congress repeal the quantity limit proviso of the Robinson-Patman Act appears headed for oblivion in the present Congress. The proposal was made by the 51-member Attorney General's Committee to Study the Anti-Trust Laws in a lengthy and comprehensive report submitted to Congress in May.

This recommendation and a number of others, notably the Committee's advocacy of efforts to repeal state "fair-trade" (minimum price maintenance) statutes, blew up a storm of protest in hearings before the House Judiciary anti-trust subcommittee in June. Winston Marsh, executive secretary of the National Association of Independent Tire Dealers, put his organization in solid opposition to the Q-L repeal proposal in testimony before this group.

The first, and thus far, only quantity limit imposed under this 19-year-old proviso came four years ago when the Federal Trade Commission issued a quantity limit rule for replacement tires and tubes. The ruling has never gone into effect, owing to court action taken by major tire manufacturers, oil companies, and a few large distributors seeking temporary and permanent injunctions against the FTC action.

The case is now before the U. S. District Court for the District of Columbia, which was asked recently by the Department of Justice for a summary judgment dismissing the injunction suits. The Justice Department is defending the rule for the Federal Trade Commission, even though a committee named by Attorney General Brownell has urged repeal of the statutory provision under which the rule was issued.

National News

Second International Rubber Quality and Packing Conference Held in New York; 1954 U.S.A. Imports Show Some Quality Improvement

The Second International Rubber Quality and Packing Conference[1] was held at Essex House, New York, N. Y., May 3-6, with representatives of 11 major natural rubber producing and consuming nations and members of The Rubber Manufacturers Association, Inc., and the Rubber Trade Association of New York in attendance. The Conference was arranged by the RMA and the RTA. W. J. Sears, RMA vice president, and R. D. Young, RTA president, acted as co-chairmen.

The Conference opened with several of the delegates making statements, reviewing their experience with natural rubber quality and packing problems during 1954.

The RMA and the RTA supplied the Conference with a series of tables showing the record of conformance to RMA-type samples, type descriptions, and packing specifications during 1954, based upon United States imports, by grade, from each producing country. An analysis of these figures in comparison with similar data covering the three preceding years was circulated and is reproduced in Table 1.

TABLE 1. CONFORMANCE WITH RMA STANDARDS—1951-1954

Percentage of Dry Natural U.S.A. Imports

Year	Imports by	Proper Tender	Within ¼	Off Quality Total	Off Quality ¼	Off Quality ½	Off Quality 1	Off Quality 2 or More	Tot. Off ½ or More
1951	GSA*	58.4	75.4	41.6	17.0	13.6	8.9	2.1	24.6
1952	GSA & Priv.	65.4	83.6	34.6	18.2	12.7	3.3	0.3	16.3
1952†	Priv.	72.0	86.7	28.0	14.7	10.1	2.7	0.2	13.0
1953	Priv.	69.9	88.3	30.1	18.4	9.8	1.8	0.1	11.7
1954	Priv.	71.7	87.5	28.3	15.8	11.0	1.2	0.3	12.5

*U. S. General Services Administration. †Last half.

Conformance of natural rubber imports to RMA standards shows wide variance by type of rubber. The greatest difficulty again in 1954 was with Thick Blanket Crepes (Ambers) and Thin Brown Crepes, it was said. Ribbed Smoked Sheets in all grades showed a lack of conformance that should be more readily remedied than the two previously mentioned types.

A comparison between the last six months of 1952 and the years 1953 and 1954 on conformance by type of rubber is shown in Table 2 (page 498).

[1]See RUBBER WORLD, April, 1955, p. 78, for agenda.

Table 2, in addition to showing complete conformance to RMA standards, also shows the proportion of total imports that are no more than ¼ grade off standard, which shows the practicability of the standard, it was said. During 1954 most types showed better conformance to RMA standards than in 1953, but, conversely, the seriousness of the complaints on the more popular types increased over 1953 figures.

No statistics are available on the consumption of natural rubber by type or grade. These import analyses show the grade distribution of imports, but by reason of the upgrading program of GSA rotation, they may not accurately reflect the consumption pattern.

Table 3 shows the distribution of 1954 imports for the 78.8% of total dry natural rubber imports on which all these figures are based. For each type there is also shown the percentage distribution by country of origin of the total tonnage of each type imported. The numeral shown in parentheses under each country's percentage is the ranking of that country's rubber in conformance to RMA standards.

RMA Statement on Quality

S. W. MacKenzie, of U. S. Rubber, chairman of the RMA delegation, in his statement suggested thinking of quality in terms of uniformity and remembering that the rubber manufacturing industry is not compensated by allowances granted in its use of off-quality rubber.

TABLE 2. CONFORMANCE OF DRY NATURAL RUBBER IMPORTS TO RMA STANDARDS (IN %)

RMA Type	Complete Conformance			¼ Grade or Less Off			More Than ¼ Grade Off*		
	Last Half '52	Year 1953	Year 1954	Last Half '52	Year 1953	Year 1954	Last Half '52	Year 1953	Year 1954
Ribbed Smoked Sheets	77.4	73.5	76.1	91.4	91.0	90.1	8.6	9.0	9.9
Pale Crepes	89.5	90.1	93.3	94.9	95.7	96.9	5.1	4.3	3.1
Estate Browns	86.5	86.8	92.5	90.8	93.7	96.4	9.2	6.3	3.6
Thin Browns	49.2	52.9	53.2	68.1	82.5	83.3	31.9	17.5	16.7
Ambers	41.5	31.7	38.4	67.6	63.1	61.8	32.4	36.9	38.2
Smoked Blanket†	81.2	67.7	63.2	89.7	98.8	96.7	10.3	1.2	3.3
Flat Bark	86.8	88.9	84.0	95.6	98.1	96.9	4.4	1.9	3.1
All Types	72.0	69.9	71.7	86.7	88.3	87.5	13.3	11.7	12.5

*Represents serious non-conformance.

†Practically all Smoked Blanket imports were of a type other than described in the RMA "Type Descriptions and Packing Specifications for Natural Rubber"; therefore these data do not reflect conformance to the RMA type, but indicate conformance to the grade purchased.

TABLE 3. ANALYSIS BY TYPE AND ORIGIN OF 78.8% OF DRY NATURAL RUBBER U.S.A. IMPORTS DURING 1954

Type of NR	In 1,000 L.T.	% Each Type to Total	Indonesia	Malaya	Thailand	Indo-China	Ceylon	Other
			Percentage Distribution of Each Type of Rubber by Source					
RSS	281.8	68.5%	33.1% (2)	25.7% (3)	28.1% (4)	11.9% (1)	0.03% (1)	1.17% (1)
Thin Pale	12.6	3.0%	91.6% (3)	6.4% (4)		1.6% (2)	0.4% (1)	
Thick Pale	3.2	0.8%	18.8% (2)				81.2% (1)	
Estate Brown	11.7	2.8%	61.3% (3)	4.3% (4)	0.4% (1)	30.2% (2)	3.5% (1)	0.3% (5)
Thin Brown	30.4	7.4%	61.7% (4)	4.0% (5)	29.7% (3)	4.3% (2)	0.3% (1)	
Amber	42.9	10.4%	57.3% (2)	39.4% (3)	3.0% (1)	0.3% (4)		
Smoked Blanket	8.0	1.9%	25.2% (2)	66.7% (3)	7.6% (4)	0.5% (1)		
Flat Bark	21.3	5.2%	62.3% (5)	11.8% (4)	22.6% (3)	0.9% (1)	2.3% (2)	
Total	411.7	100.0%	41.5% (4)	24.2% (6)	23.1% (5)	9.5% (2)	0.9% (1)	0.8% (3)

The consuming industry in the U.S.A. has continually emphasized that natural rubber must be carefully graded according to acceptable standards and properly packed if it is to compete successfully with synthetic rubber. The U.S.A industry has established purchase specifications for natural rubber in the form of the "RMA standards," and this policy is in accordance with general practice for all the materials it buys. This practice is considered necessary for the most efficient processing of material and also results in suppliers competing with one another to meet the buyers' specifications.

Reference was made to the transfer of the U.S.A. government synthetic rubber plants to private industry and the fact that competition between natural and synthetic rubber exists for the first time. Improvements in the quality and packing of synthetic rubber are anticipated, and producers will engage in elaborate technical service programs to educate the consumer to the advantages of synthetic rubber, it was pointed out.

In the long term, natural rubber must withstand this competition. Natural rubber quality and packing can be improved, and we believe it must be to meet the challenge of competition from its chemical counterpart, Mr. MacKenzie said.

Other Statements on Quality

Other delegations expressed the desire for universal or international type samples, and it was recommended that the RMA type descriptions and packing specifications be called "international." The United Kingdom rubber manufacturers' delegation suggested that acceptable universal type samples could be established if a realistic approach were made by recognizing the conditions existing in the rubber producing countries wherein a substantial quantity of rubber produced did not meet RMA standards.

The RMA delegation stated it would not approve the lowering of the types and pointed out that on previous occasions when standards had been lowered the shippers continued to supply below the new type. The RTA of London and the Netherlands RTA did not think the adoption of universal standards would lower quality; while the Indonesian and Malayan delegations were in favor of maintaining RMA standards without change.

Type Sample Acceptance Good

It was found that there was general acceptance of the RMA-type samples and descriptions for the following types and grades: R.S.S. grades #1, #2, and #3; 1X, 1, 2, and 3 Thick and Thin Pale Crepes; 1X, 2X, and 3X Estate Brown Thick Crepes; Flat Bark Crepe (no samples, only description on Standard Flat Bark Crepe); and Pure Smoked Blanket Crepe.

As to RMA and Singapore Types #4 and #5 R.S.S., it was decided that these should be retained separately as agreed upon in Singapore, 1954. It was also agreed that the RMA Estate Brown Thin Crepe and Malayan Compo Types were equal, subject to the substitution of two of the sheets in the Singapore Type Sample of #3X Brown Crepe. Regarding RMA and Singapore Thin Brown Remilled Crepes and Thick Blanket Crepes, it was agreed that the other Singapore types be continued, except that the #4 Amber ("D" Thick Remilled Blanket Crepe) be equivalent to the RMA type, subject to the assent of the RTA of Singapore.

Committee recommendations that a sample be established for Air-Dried Sheets, and that it was not yet practical to establish samples for R.S.S. Cuttings, or for Skim Latex were adopted.

The Joint RMA-RTA Type Sample Committee explained methods of preparing and distributing RMA Type Samples to trade and industry. The SCCRA[2] delegate pointed out that its procedures as to Singapore Type Samples were similar to those of the Joint RMA-RTA Committee.

During the First Conference at Singapore, the U.S.A. delegate had asked the producer organizations in Singapore, Malaya, and Indonesia to assist in the RMA Type Sample duplication program by forwarding rubber that could be used by the Joint RMA-RTA Type Sample Committee in the preparation of RMA Type Samples. The SCCRA offered to cooperate by supplying sample material upon request.

Appreciation was voiced of the efforts of the Djakarta Sampling Committee to supply local samples to estates for their guidance. It was pointed out that in order to afford a wider distribution, RMA Type Sample might be duplicated by associations in producing countries, but that the responsibility rested with the individual associations; this policy is in accordance with the report of the Packing and Marketing Committee of the International Rubber Study Group.

Raw Materials for Various Rubbers

The Conference reviewed and accepted the definitions of the kinds of raw material to be used in the preparation of the various types of rubber, as shown in the RMA Type Descriptions and Packing Specifications for Natural Rubber. Since the finished types of rubber are no better than the materials used in their preparation, the Conference discussed the possibilities of improving the quality of the raw materials. The delegates from producing countries explained the efforts being undertaken through education and supervision to improve the basic quality of natural rubber.

The problem of the control of the ever-increasing quantities of skim rubber now being produced was considered. The Conference was unanimous in deciding that steps to control production and distribution on the lines suggested by the MRERB[3] and the SCCRA should be instituted in Malaya and followed as soon as possible in the other producing countries concerned.

Delegates from consumer nations stressed the importance of reducing moisture content and avoiding copper and manganese contamination. In this connection, an analysis was presented of the copper and manganese contents of the three types of bale coating powders allowed by the RMA Packing Specifications, i.e., talcs, whitings, and clays. This is shown in Table 4.

[2]Singapore Chamber of Commerce Rubber Association.

[3]Malayan Rubber Export Registration Board.

From these figures, it was pointed out that talc contains a considerable quantity of harmful metals, with even the whitings and clays showing appreciable amounts of manganese. Based on the rubber, the amount of contamination resulting from the use of ½ pound of powder per 250-pound bale, when the whole bale is masticated, amounts on the average to an additional 0.08, 0.02, 0.02 ppm. copper and 1.2, 0.3, 0.1 ppm. manganese for talc, whiting, and clay, respectively. If the wrapping sheets weighing 10 pounds, for example, are removed and used by themselves, these figures become 2.0, 0.5, 0.5 ppm. copper and 30.0, 7.5, and 2.5 ppm. manganese, respectively.

It was suggested, therefore, that bale coating powder be removed, where possible, from bales by scrubbing or brushing before blending. Manufacturers were asked to report any difficulties they had experienced which could be attributed to the harmful metal content of these powders.

Technically Classified Rubber

The Conference took note of the progress that had been made in the production and use of Technically Classified Rubber. World production, in long tons, for the years 1949 to 1953 were reported as follows: 1949, 1,584; 1950, 3,788; 1951, 8,853; 1952, 24,595; and 1953, 48,080.

A breakdown of the 60,588 long tons of T.C.R. produced by different territories in 1954 was: Indo-China, 12,203 long tons; Indonesia, 10,318 long tons (figure incomplete); and Malaya, 38,067 long tons.

Efforts were said to have been made to extend the classification of rubber from smallholdings and small estates packed in godowns and from remilling factories. This work has been confined largely to Malaya. The output for 1954 from packing houses and remilling factories, in long tons, was: packing house rubber, 2,295 R.S.S. #1 and #2; 1,620 R.S.S. #3, #4, and #5; and 31 air dried sheet; and remilled grades, 830. The total amounted to 4,776 long tons.

It was noted that certain smaller manufacturers, particularly in Europe, had indicated an interest in this material, but there was some doubt as to the desirability of extending classification of rubber to the lower grades. The delegate from the RRIM,[4] speaking on behalf of the IRDC,[5] requested that consumers of this type of rubber furnish that organization with their reactions so that a decision could be reached about continuing research in this direction.

The RTANY made known that efforts to interest American manufacturers in T.C.R. had been made, but without success, except in the case of the wire and cable industry. Few consumers were interested in buying this rubber at a premium. The RMA added that manufacturers had been able to meet their end-product requirements for the most part through the use of standard types of rubber. The chairman stated that efforts were now under way to convene a meeting of producer research representatives and consumer technical men to discuss this and other related problems.

TABLE 4

Sample and Source	Copper Content, Ppm.	Manganese Content, Ppm.
Talc. Dutch origin. Inspection sample	49	580
Norwegian. Commercial supplies, K. L.	40	840
Norwegian. Inspection sample	45	650
	25	424
Singapore, Commercial supplies	34	690
Whiting. English origin. Commercial supplies	7	228
Singapore. Commercial supplies	7	130
Kuala Lumpur, local origin. Commercial supplies	2	284
Chemically precipitated	7	63
Japanese origin. Commercial supplies	23	4
Clay K. L. Commercial supplies	7	136
K. L., local Malayan origin	7	53
East African origin. Inspection sample	12	24

Factory Problems—Faulty Rubber

Representatives of consuming nations explained to the Conference the difficulties encountered in handling and processing faulty rubber. The RMA, with the U. K., Germany, and Canada concurring, called attention to the exhibits indicating the difficulty in palletizing misshapen bales, and observed that both this and poor markings as well as dirty bales, improper packing, and improper banding add to factory costs.

The RMA emphasized that discolored bales and wet rubber present special problems in plasticating and that both conditions give rise to lumps that carry into compounding, resulting in improper dispersion and faulty end-products. It was also noted that the uniformity of material is particularly important to manufacturers who make a great variety of end-products and that it had been the experience of such manufacturers that proper use of RMA bale coating solutions do much to insure against the accumulation of extreme dirt. Color and odor were mentioned as other objectionable features when the material is used for particular end-products.

Packing Specifications

The Conference reviewed in detail the RMA Packing Specifications, which were generally acceptable, subject to consideration of some minor points. It was noted that the Packing Specifications issued by the SCCRA in connection with the seven Singapore Type Samples substantially conformed with the RMA Packing Specifications. The RTA of London reported that such organization had, as of April 1, 1955, adopted the RMA Packing Specifications. However, in the RTA of London contracts, non-conformance to these specifications is not a cause for rejection.

In connection with Flat Bark, representatives of the Steamship Conference objected to the shipment of coated unwrapped bales, as permitted in the RMA specifications. The Conference recommended experimental shipments to determine the practicability of this specification.

The Conference approved in principle the desirability of uniform bale weights. It also agreed that it would not be necessary further to refine the procedures called for in the milling test in reference to bale coatings, in view of the marked improvement in these coatings.

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[4]Rubber Research Institute of Malaya.
[5]International Rubber Development Committee, London.
[6]Indonesian Rubber Research Institute.

In discussing bale marking paints it was pointed out that the RMA Packing Specifications on this matter had been revised with the December, 1954, issue of the RMA Green Book. It now provides that the RMA will not specify any particular bale marking paint or pigment, but will review for acceptance and endorsement bale marking paints developed and manufactured in rubber producing countries. The RMA has endorsed and accepted the marking paints developed by INIRO[6] and the RRIM for all RMA types of rubber other than Pale Crepes and Estate Brown Thin Crepes.

Regarding the degree of preference for paper bag packing, the RMA asserted that it was a matter of preference on the part of individual manufacturers and pointed out that #1 Pale Crepe arriving from Sumatra in paper bags was in excellent condition. Where absolute cleanliness is the criterion, this type of packing appears satisfactory, and the additional costs are approximately offset by the loss in usable rubber on rubber-wrapped pale crepe. The RMA also said that a standard bag or a specific type of liner cannot yet be recommended. The MRERB declared that it was greatly interested in this type of packing and felt that it should receive more study.

Sampling, Inspection, and Claims

Methods of sampling, weighing, inspecting, and arbitration procedures in use in the United States were explained and demonstrated to the delegates. The RTANY, in reply to a statement made by the Netherlands RTA that the New York trade should expedite the forwarding of debit notes to their shippers to minimize the difficulty Indonesian shippers had in obtaining the necessary foreign exchange to pay claims, said that their claims were presented promptly, and while they must settle immediately with the manufacturers, collection of claims from Far Eastern shippers requires from three months to a year. In a six-month period the loss of interest charges alone cost New York dealers as much as $25,000 against a total outstanding claim figure of $300,000, the RTANY asserted. This discussion, however, made clear that there is a need of accelerating both the filing and settlement of claims.

Shipping and Handling

The problems involved in shipping, handling, and delivery of natural rubber followed on the agenda. Water damage was seen to be a major difficulty, and it was

Blackstone Studios, Inc.

Joseph Louis, Littlejohn & Co., RTANY delegation chairman

Pach Bros.

S. W. MacKenzie, U. S. Rubber, RMA delegation chairman

agreed that steps must be taken against it. The chairman, taking cognizance of progress made in this direction, congratulated the MRERB on its efforts to halt water damage in Singapore. Misshapen bales and how to prevent them were also discussed. The chairman took note of the statement by the NYCIFEL[7] that it had appointed a committee to work with the RMA-RTANY on separation materials and indicated these groups would confer as soon as they had received a report from rubber technicians concerning plastic films and coated paper which might be suitable for dunnage.

As to markings, it was pointed out that the type and quality of paint was extremely important in preventing defacement. The current use of RRIM and INIRO paints was said to have the endorsement of the RMA and the RTANY. The stability of markings was also said to be dependent on such factors as transport, dunnage, color, bale deformation, and coating solution, and it was suggested that all phases of the rubber industry direct their attention to this problem.

[7]New York Committee of Inward Far East Lines.

Contracts

The lack of a universal contract and the many variations in the contracts now in use were also discussed, but no solution to this problem was reached. In the last analysis, it was said, a contract represented only an individual agreement between buyer and seller.

The Conference finally expressed its opinion that it would be desirable for the producing countries, other than Malaya, to adopt supervision over quality and packing as exercised by the MRERB.

Future Meeting

The RTANY, lauding the achievements of the first two International Rubber Quality and Packing Conferences, suggested London as the site for the third. The U.K. manufacturers' delegation and the RTA of London, however, did not think it then appropriate for the Conference to discuss the matter; so no decision was taken.

Latest IRSG Statistics and Estimates

1955 Estimated Natural and Synthetic Rubber Consumption and Final 1954 Figures

(In 1,000 Long Tons)

	1954			1955		
Territory	Natural	Synthetic*	Total	Natural	Synthetic*	Total
U.S.A.	596¼	†634¾	1,233	585	†815	1,400
United Kingdom	239	8¾	247¾	243	20	263
Federal Republic of Germany	130	17	147	140	20	160
France	127¾	14½	142¼	133	19	152
Japan	89	2¼	91¼	89½	3½	93
Canada	41½	†30	71½	37	†36	73
Italy	54	10	64	59	13	72
Australia	43¼	½	43¾	50	½	50½
Belgium	18½	1½	19¾	21	2	23
Netherlands	19¼	1¼	20½	20½	1½	22
Denmark	7	½	7½	7	½	7½
Other countries	402¼	17	419¼	445	24	469
Totals	1,767½	740	2,507½	1,830	955	2,785

*Excluding synthetic rubber production in the USSR and the German Democratic Republic.
† Including oil-content of oil-extended rubbers.

A communiqué from the International Rubber Study Group, London, England, under date of May, 1955, reported on a meeting of its management committee which had been held to examine the world statistical rubber position and to make estimates for natural and synthetic rubber production and consumption during the year 1955.

A general summary of this communiqué appeared in our June issue (page 364), at which time the 1955 world production of natural rubber of 1,845,000 long tons and the 1955 world production of 985,000 long tons of synthetic rubber were given. A more detailed breakdown of the production, consumption, and supply/demand position for both natural and synthetic rubbers is now presented in the accompanying table.

1955 Estimated Natural Rubber Production and Final 1954 Figures

(In 1,000 Long Tons)

Territory	1954	1955
Indonesia	739	748
Malaya	584	600
Thailand	117	113
Ceylon	94	95
Viet-Nam	54	60
British Borneo	41	49
Liberia	38	37
Belgian Africa	22	26
Cambodia	24	25
British Africa	21	23
Burma	12	12
French Africa	3	3
Other countries	53½	54
Totals	1,802½	1,845

1955 Estimated Synthetic Rubber Production and Final 1954 Figures

Territory	1954	1955
U.S.A.	622½	886
Canada*	86½	93
Federal Republic of Germany	7	6
Totals	716	985

*Including oil-content of oil-extended rubbers.

Tongberg Sees Petroleum Chemicals Boom

Petroleum chemicals are no longer considered by-products, but are now one of the main objectives of modern petroleum processing, Carl O. Tongberg, a vice president of Esso Research & Engineering Co., New York, N. Y., told the midyear meeting of the Interstate Oil Compact Commission at Denver, Colo.

Dr. Tongberg particularly cited the rise of the petroleum-derived plastics and synthetic rubber industries as evidence for his assertion. National petrochemical production, he said, today totals about 30 billion pounds annually, compared with 150,000 pounds recorded for 1920, with all indications pointing to continuing growth.

Resins and plastics made from petroleum, he continued, are replacing steel in automobile parts and pipes, lumber in building panels and boat hulls, rubber in wire insulation and gaskets, ceramics in dinnerware, paper in transformer coils and packaging materials, and leather in footwear and upholstery.

URW Announces Wage Program; Firestone and Goodrich Pension Contracts Signed

The United Rubber, Cork, Linoleum & Plastic Workers of America, usually referred to as the URWA, CIO, held a meeting of its international policy committee in Chicago, Ill., June 10 and 11. It was reported that the union will ask for a "substantial and adequate" pay raise and a guaranteed annual wage this year. Rubber industry management has taken the position that the GAW cannot be discussed if wages are discussed on a contract reopener. None of the major rubber company master wage contracts runs out until late in 1956; they do, however, contain a wage reopening clause.

Other objectives of the URWA were given as elimination of wage rate differentials in skilled trades and/or production or maintenance workers, elimination of intra-plant and area wage differentials, improvements in vacations, sick-leave allowances, night-shift bonuses, holiday pay, etc.

Also, the union called for an adequate seniority and other contract provisions, including a reduction in hours without loss of pay where necessary, to protect employes who may be displaced by increasing development and utilization of technological advances.

Meanwhile the Firestone Tire & Rubber Co., on May 25, and The B. F. Goodrich Co., on June 19, signed new five-year pension and insurance contracts with the URWA. The provisions of these new contracts were essentially the same as the one signed by the Goodyear Tire & Rubber Co., on May 6, and reported in our June issue on page 367. In the case of the Goodrich settlement, the agreement averted a strike set for midnight on June 19.

The Armstrong Rubber Co., West Haven, Conn., also signed a new two-year contract with the local URWA union in early June. A seventh paid holiday and an extra day's vacation pay for each year of service between 11 and 15 years were the new features of this contract.

Other Industry News

Isocyanate Plant Near Completion; Mobay Reviews Polyurethane Uses

Mobay Chemical Co.'s New Martinsville, W. Va., isocyanate chemicals plant, the first such full-scale production unit in America, is now more than 40% complete and should be in operation by October, David L. Eynon, president, told a press conference at the firm's home office in St. Louis, Mo., June 8.

Production capacity of the plant, when completed, is expected to be several hundred tons of isocyanate chemicals and equivalent amounts of polyester resins a month, as well as other materials needed to manufacture the new polyurethanes, such as activators, modifiers, and catalysts.

Mobay itself will make no polyurethanes, but will supply the raw materials, machinery, and technical knowledge to licensees for the manufacture of the finished polyurethane goods.

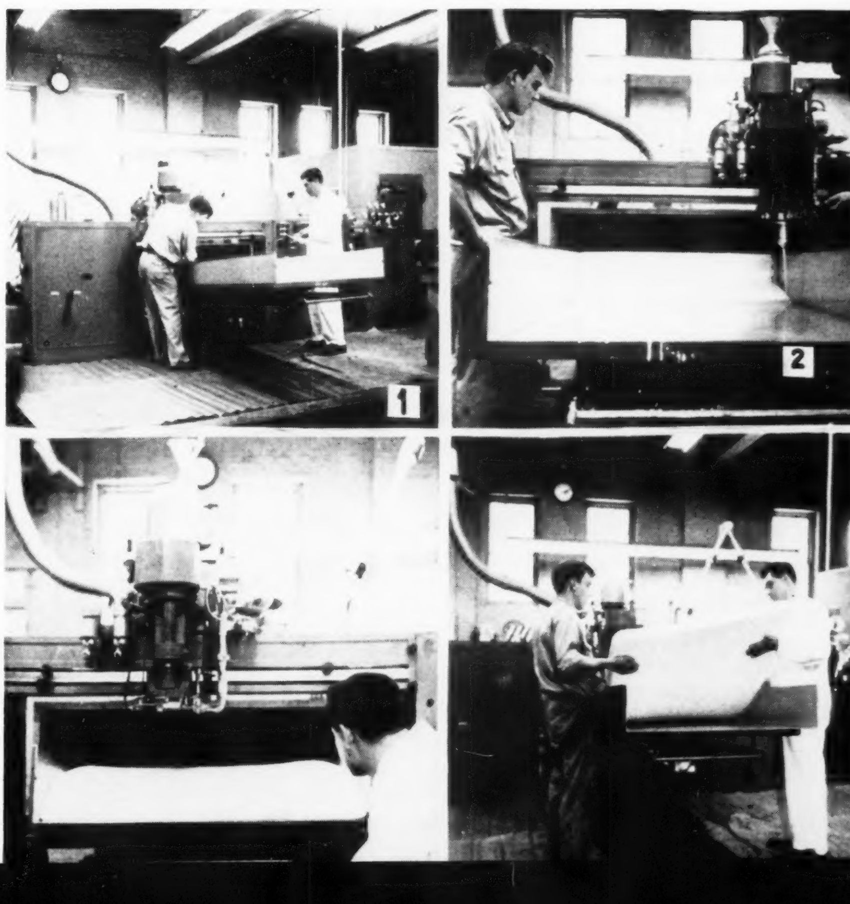
Until the New Martinsville plant is completed, the company will supply licensees with raw materials from an interim plant at Anniston, Ala., and from imports from Farbenfabriken Bayer, A.G., of Germany, which, together with Monsanto Chemical Co., formed Mobay in 1954. Bayer has been producing isocyanates for more than three years.

Among the exhibits on display at the St. Louis press conference was a model UB machine that can turn out a block of polyurethane foam 40 inches wide, nine inches thick, and six feet long in less than four minutes. Besides rigid and flexible foam, polyurethanes can provide the basis for such goods as wire coatings, paints, synthetic rubber, and adhesives, company executives declared.

Licensees for the manufacture of flexible foam now were said to include Dryden Rubber Division of Sheller Mfg. Corp., Dunlop Tire & Rubber Corp., William T. Burnett & Co., Inc., The Goodyear Tire & Rubber Co., American-Collo Corp., Dayton Rubber Co., and Albert Trostel & Sons Co., Inc., in addition to The B. F. Goodrich Co., The General Tire & Rubber Co., and Curtis-Wright Corp., previously licensed by Bayer.

Available to licensees is a variety of types and styles of machines, ranging from small, fixed-head units used in conjunction with small-size molds to large foam block-producing machines, James D. Mahoney, Mobay's general manager of sales,

Production of a flexible urethane foam slab with a Mobay machine: (1) operators stand by rectangular mold, waxed to prevent adhesion of material; (2) production run has started, with mixing head moving back and forth across the mold as it moves into hood so that fumes can be vented; (3) run is completed: operator waits for foaming to subside; (4) mold is slid out of hood; slab is removed



told the assemblage. These machines are essential to the manufacture of foams, he added, since only through mechanical control can the foaming action, completed in 30 seconds, be properly channeled.

Among the startling possibilities declared feasible for the new polyurethanes is the so-called 100,000-mile tire, one that would last the full life of the car. This eventuality was discussed by Robert H. Kittner, Mobay's director of development, who said that some industrial truck tires made of urethane synthetic rubber have been in use in Europe for several years and have given remarkable performance.

Mobay was working on a storage-stable urethane material that could be processed on standard rubber processing equipment, Mr. Kittner declared, but he would not predict a deadline for the commercial introduction of the material.

The urethane rubbers were reported to vary in hardness from a Shore A of 15-20, practical for printing press rollers, to a Shore A of 95, as found in gears and textile loom parts. In Europe, the Bayer trade name for these materials is Vulcollan.

Also successfully used in Europe, and soon to be introduced on the American market, is urethane paint, said to provide almost absolute scuff-resistance to floors. Transparent or opaque in a wide range of colors, and impervious to grease, oils, alkalies, and acids, these paints were said to have given long service in European breweries, slaughter houses, dairies, chemical plants, and steel mills.

A urethane coating enamel for magnet wires, having extreme moisture resistance and solderability, was declared another proven application. According to Mr. Kittner, the basic chemicals for this enamel, Mondur S, the isocyanate, and Multron R-2, the polyester, are now commercially available to fabricators.

Also suggested for use in the United States are railroad cars made of urethane foam sandwiched between aluminum sheets. High-speed streamlined cars of such design are being produced in Germany, it was said. The lightweight foam is known to have remarkable bonding-to-metal qualities.

Other applications of polyurethane foam expected to find popularity in this country include car cushioning, shoulder pads for suitings, carpet underlay, and sponges. The foam is easily fabricated, is not affected by cleaning solvents, and has long life.

Named to New Columbian Carbon Division

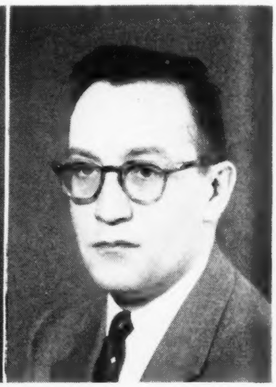
Edwin B. Brooks has been named general sales manager of the new pigment division of Columbian Carbon Co., New York, N. Y. The division was recently formed to assume the sales functions formerly handled for Columbian by Binney & Smith, Inc.

C. O. Davidson will head domestic sales for the division and will be assisted by John T. Kealy, in charge of iron oxide pigment sales, and Randolph Foster, in charge of sales of carbon black and carbon dispersions to non-rubber consumers. Also named were John W. Snyder, to head technical service to carbon black consumers; C. D. Downs, to head technical service on iron oxides; and Charles A. Polachi, to supervise the international business of Columbian as vice president of Binney & Smith International, Inc., now a wholly owned Columbian subsidiary.

Agencies and branches previously maintained by Binney & Smith for the sale of Columbian pigments have been acquired by Columbian and will be operated by their present staffs. Branches affected are in Akron, Boston, Chicago, Detroit, Philadelphia, and Toronto.


Edwin B. Brooks


C. O. Davidson


Charles A. Polachi

Koroseal in Minesweeper

Koroseal pipe and fittings have been used to some extent as a substitute for metal on the new *U.S.S. Cormorant*, a minesweeper, in order to diminish the ship's attraction for magnetic mines, according to Clyde O. DeLong, president of The B. F. Goodrich Co. Industrial Products Division, Akron, O., manufacturer of Koroseal.

The rigid plastic went into the making of pipes to handle bilge, cold salt water, and cold fresh water, as well as voice tubing and diesel oil collector tanks and water tanks. Metals such as steel, copper, and cast-iron were replaced, with considerable saving in weight.

The 144-foot hull of the *Cormorant* is constructed of wood.

Electronically Tensioned Cord in U. S. Rubber's Belts

V-belts made with textile cord that has been tensioned electronically instead of through the conventional mechanical pulley system have been placed on the market by United States Rubber Co., New York, N. Y. The newly developed electronic technique is said to have resulted in cord with absolute uniformity of tension, making for vibration-free V-belts with increased longevity.

The new manufacturing method is more accurate than present industry procedure and is expected to prove beneficial to manufacturers of equipment on which vibration is a serious problem, such as home appliances, according to Ernest G. Brown, vice president of the company and general manager of its mechanical goods division.

Belt stretch and shrinkage are closely controlled by the new production method, Mr. Brown asserted, and vibration, especially serious in drives where outside idlers or pulleys are used, is either eliminated or reduced to a negligible point.

Since the cord is under the same tension throughout, the load is equally distributed. Mechanical tensioning systems often result in too-tight isolated cords that become overloaded and cause premature failure in V-belts, he said.

The exact design of the new electronic technique has not been revealed.

Develop Silastic-Glass Tire

An experimental silicone rubber-glass fiber tire that will withstand temperatures ranging from minus 90 to 500° F. has been developed jointly by United States Rubber Co., New York, N. Y., and Dow Corning Corp., Midland, Mich.

The extremely high cost of the tire prohibits commercial application to automotive vehicles, the companies say, but a possible use may be found for it in supersonic aircraft where ordinary tires would disintegrate in the excessive frictional heat encountered in flight.

The ply skimcoating, treads, and sidewalls of the tire are made of Dow Corning's Silastic silicone rubber. The bead wires and reinforcing glass fibers are coated with silicone adhesive. A conventional tubeless tire mold was used in the construction. The finished tire is pink-orange in color and its outer ply is translucent.

Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., has purchased 11.5 acres of land adjoining its Ironton, O., plant for expansion of its manufacturing facilities there.

Goodyear Aircraft Erecting $3,000,000 Research Facility

A $3,000,000 engineering and research building devoted to the development of new products in the fields of aerophysics and electronics is being constructed by Goodyear Aircraft Corp., Akron, O., it was revealed by P. W. Litchfield, president of the firm and chairman of the board of The Goodyear Tire & Rubber Co.

The new three-story steel-and-concrete air-conditioned building will have dimensions of 400 by 125 feet and will adjoin the north end of the firm's Plant C. Work is expected to be completed by the Summer of 1956. Modernization and improvement of other Goodyear aircraft facilities are scheduled to begin soon.

In making the announcement, Mr. Litchfield declared, "Our new building will permit the efficient concentration of our engineering and research personnel and provide for expansion of our technical staff to meet the rising tempo of scientific engineering and research requirements under modern working conditions."

Goodyear established its first aeronautics department in 1910. The company currently makes non-rigid airships, guided missiles, analog computers, radar devices, plastic radomes and canopies, and other aircraft and related products.

Largest Tall Oil Still in Use

What is said to be the largest tall oil fractionating still in the world is now in operation at the Panama City, Fla., plant of Arizona Chemical Co., New York, N. Y., according to Richard E. Sumner, president of the firm, which is jointly owned by American Cyanamid Co. and International Paper Co.

The new facility boosts Arizona Chemical's capacity for fractionated tall oil products to 2½ times its former capacity, Mr. Sumner revealed. The company obtains its crude tall oil, a mixture of rosin and fatty acids, from the by-product liquors of International Paper. Consumption of tall oil products has risen during the last 10 years to third in volume among the inedible fats and oils used in industry.

Complete separation of tall oil into essentially pure rosin and fatty acids was first achieved in 1949 by American Cyanamid, Mr. Sumner declared, and Arizona Chemical put the technique into commercial operation a year later.

Rubber Bulk Gasoline Tanks

"Pillow-type" rubber tanks for emergency or temporary storage of liquids in bulks of up to 10,000 gallons are being produced by The Goodyear Tire & Rubber Co., aviation products division, Akron, O. The collapsible tanks, originally developed for military use, are said to be particularly valuable for gasoline or fuel oil storage on remote construction projects.

According to Goodyear, the tanks are constructed of two layers of fabric-reinforced synthetic rubber, vulcanized into a single unit. The inner layer of fabric consists of a gasoline barrier embedded between two layers of gasoline-resistant synthetic rubber. The barrier serves as protection against porosity and loss by permeation. The synthetic rubber is unaffected by gasolines with up to 30% aromatic content.

Although the tanks are being made in 900-, 3,000-, and 10,000-gallon sizes, units up to 50,000-gallon capacity will be manufactured on order. Assembly by non-technical personnel is easily achieved, the company declares.

A 12-page illustrated brochure is available on request.

Deflated U. S. Rubber pneumatic mounting band being removed after assisting in installation of tubeless tire

Pneumatic Mounting Band For Tubeless Tires

A pneumatic mounting band said to effect quick and simple mounting of tubeless tires has been developed by United States Rubber Co., New York, N. Y. According to the company, the tire is first placed over the wheel rim, and the mounting band set into position around the outside of the tire. The band is inflated, forcing the tire beads into a seal against the rim. Simultaneously, the tire is inflated, and the mounting band deflated. The pneumatic unit weighs five pounds, has no moving parts, and fits all passenger-car tires.

First Tubeless for DC-6

A DC-6 United Air Lines Mainliner is the first scheduled commercial airliner to be fully equipped with tubeless tires, according to B. F. Goodrich Co. Tire & Equipment Division, Akron, O., manufacturer of the four main wheel tires and one nose wheel tire used.

The tires were put into operation after extensive tests at United's San Francisco, Calif., maintenance base and were granted CAA airworthiness approval for commercial service. The tires are said to represent a weight reduction of 8% over the traditional tire and tube. Other advantages, Goodrich reports, are cooler operation, greater safety, lower maintenance cost, and elimination of tube failure.

The main wheel tires are size 15.50-20 and are constructed of nylon cord with a 16-ply rating. Each is rated for a 24,000-pound load. The nose wheel tire has a dimension of 44 inches. Each has a new so-called dimple tread for efficient airfield traction. Only military and some private aircraft have to date been equipped with tubeless tires, the Goodrich company further declares.

New Latex Manufacturer

A new manufacturer of industrial latex compounds, Berco Latex Co., Inc., has set up a plant and laboratory at 133 Roseland Ave., Caldwell, N. J., according to Harold D. Berger, manager, a latex chemist and technical salesman with 15 years of experience in the field. The firm will publish and distribute free a bi-monthly technical bulletin on general developments in the industry and at the Berco laboratory.

Predicts Foam Sales Boom

C. V. Soper, sales manager of the furniture cushioning division, The Dayton Rubber Co., Dayton, O., has predicted that foam latex products will one day be second only to tires as the world's biggest consumer of rubber. The statement was issued during the opening day of his company's exhibition of its Koolfoam foam latex line, held at the Waldorf-Astoria Hotel, New York, N. Y., June 7-9.

Mr. Soper also announced that Dayton had developed new techniques for molding the foam directly on to fabrics, resulting in improved body, texture, and wearability of the products. This feature is expected to bring about the rapid growth of the use of combination latex-fabric materials for floor coverings, draperies, slip covers, and upholstery, he said.

Representatives of the furniture, garment, and shoe industries attended the three-day showing. Also on hand were Dayton's president, A. L. Freedlander, Vice President Herbert S. Waters, and Ralph Robbins and Murray A. Perlberg, executive head and secretary-treasurer, respectively, of Imperial Foam Rubber Co., recently appointed first distributor of Koolfoam in New York, N. Y., and surrounding areas.

Goodrich Expands to Peru

International B. F. Goodrich Co., Akron, O., has associated itself with Peruvian interests in the establishment of a tire and rubber company, W. C. Gulick, president, reveals. A plant, designed by Goodrich engineers, is under construction near Lima, Peru, and is expected to be in operation some time in 1956.

Native Peruvian rubber will be used in the manufacture of tires and other rubber goods.

Architect's sketch of expanded facilities of Falls Engineering & Machine Co.

Femco Doubling Plant

A plant expansion program that will double the production, engineering, and office area of The Falls Engineering & Machine Co., Cuyahoga Falls, O., is currently under way, the company reveals. For the purpose, 80 feet of frontage adjoining the present facilities have been purchased and already contain a building housing the engineering offices of Campbell Machinery Development Co., which designs special rubber and plastic machinery built by Femco.

A new addition will consist of the shipping and receiving departments, paint and carpenter's shop, and material storage. Other space will be converted into additional assembly area for heavy machinery and for shops and offices.

The firm is a manufacturer of V-belt collapsible and ring molds and equipment such as V-belt building drums, curing cages, molders, manipulators, measuring and matching machines, notching and skiving machines. The company also makes a line of special machinery including splitters, cushion cutters, and roller die cutters.

Sperberg Forms Three-T-Fleet (Texas Tire Testers)

Three-T-Fleet is a new independent tire test fleet created to serve the rubber industry by Lawrence R. Sperberg, well-known rubber technologist. Three-T-Fleet operates in west Texas and has its headquarters in Odessa. Its operating vehicles cover the territory from Big Springs west to El Paso.

Three-T-Fleet offers a new type of carefully controlled tire test service which is an actual trucking operation that has been modified and expanded to include testing of tires as one of its functions. Since the trucks haul a pay cargo, the cost of testing tires is substantially reduced. Three-T-Fleet trucks have no set speed restrictions, but operate at speeds that conform to normal traffic flow, which in west Texas is substantially higher than in congested eastern industrial areas, the company prospectus states.

The loads carried by the vehicles are the maximum legal loads permitted by law. For 10.00-20-size truck tires, this corresponds to a load of approximately 110 to 125% of rated capacity. At present only these 10.00-20-size truck tires can be tested. Whole truck tires may be tested, but "half and half" or "two way" or "quadrant" tread tires are preferred.

Inspection and rotation of tires are made at prescribed intervals. After each inspection and rotation, a report is prepared and mailed immediately to the interested party. The data are exhaustively analyzed and arranged so that little, if any, additional work must be done to obtain the maximum of information. A final report is prepared for each tire test project, and all reports are strictly confidential.

The conventional type of passenger or truck tire test can also be run by the Three-T-Fleet, and prices will be quoted on request for this type of testing. Three-T-Fleet's specialty of truck tire testing is so attractive economically, however, that this firm is concentrating on this type of work.

A prospectus containing further details of the tire testing done by Three-T-Fleet may be obtained by addressing the company at P.O. Box 2923, Odessa, Tex.

Foxboro Regional Divisions

Ten regional sales divisions have been established by Foxboro Co., Foxboro, Mass., as part of a program of intensifying its instrument sales engineering coverage. The new regional structure will be administered by H. O. Ehrisman, newly appointed general sales manager, and J. J. Burnett, field sales manager. The firm has 48 branch offices across the country.

The ten regional sales offices and their managers include New England, H. H. Michelmore; New York, E. R. Huckman; Philadelphia, J. B. Deaderick; Pittsburgh, A. H. Shafer; Atlanta, E. W. Prendergast; Cleveland, H. L. Lee; Chicago, J. J. Connelly; Dallas, E. L. Stark; Houston, L. W. Parten; and San Francisco, R. E. Rogers.

New Goodrich Building

Construction of a three-story commercial office building intended for the sole occupancy of B. F. Goodrich Chemical Co. is now under way at 3135 Euclid Ave., Cleveland, O., it has been disclosed by John R. Hoover, president. The building will be erected and leased to Goodrich by Mintz Construction Co., Cleveland.

To have a gross area of 52,000 square feet, the structure will show an aluminum-and-glass facade and will have a steel frame construction designed to permit the possible addition of other areas.

Occupancy is scheduled for May, 1956.

Vinyl Film Men Meet

Fabricators, retailers, and manufacturers of vinyl film, including some rubber goods producers, were represented at the first meeting of the End Products Standard Committee of The Society of the Plastics Industry at the Hotel Pierre, New York, N. Y., in May. Purpose of the conclave was to discuss ways to develop minimum standards for finished vinyl film products in compliance with the Vinyl Film Standard of Quality, United States Department of Commerce, Commercial Standard, 192-53.

Rubber-Lipped Curved Zippers

Water-tight, curved zippers made with protective rubber lips seal the rear windows of the current Ford and Mercury convertibles, according to The B. F. Goodrich Co. Industrial Products Division, Akron, O., manufacturer of the product, said to be the first of its kind.

The zippers follow the contour of windows and can be fastened into place on three sides throughout a window arch. Use of the new development, the company says, results in increased rear window area and a more esthetic appearance. The zippers are made in various colors. Goodrich foresees a growing general market for the product in a variety of applications.

To Exhibit at Plastics Fair

American Latex Products Co., Hawthorne, Calif., Firestone Plastics Division, Firestone Tire & Rubber Co., Pottstown, Pa., and United States Rubber Co., New York, N. Y., will be among the exhibitors at the World Plastics Fair & Trade Exposition to be held in Los Angeles, Calif., October 5-9, according to Philip M. Kent, managing director of the event.

American Latex Products will show applications of its rigid, honeycomb, and flexible polyurethane foams, such as thermal insulation, structural reinforcement, aircraft items, and refrigeration components.

Chardon Expanding Facilities

The Chardon Rubber Co., Chardon, O., is undergoing a $3,000,000 modernization and expansion program to be completed before the end of the year, according to V. M. Brediger, president. All rubber facilities of Ball Brothers Co., Muncie, Ind., of which Chardon is a subsidiary, will be transferred to the Ohio firm.

The program will include the erection of new buildings, the installation of automatic controls, and the rearranging of plant departments to achieve a streamlined flow of materials. Plant capacity will be more than doubled, Chardon reports.

Hale & Kullgren, Akron, O., engineers, will supervise the program.

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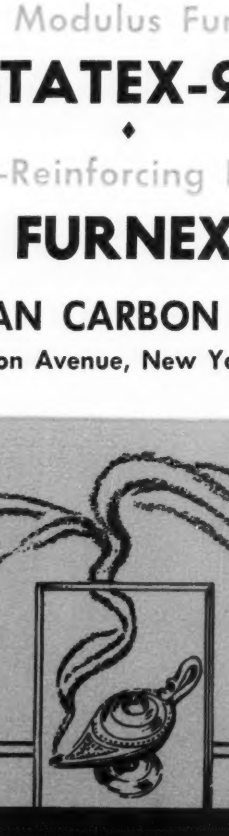
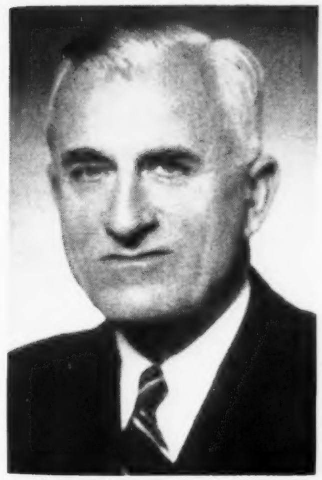


Pach Bros., N. Y.

John P. Coe

G. Allen Lovell



Pach Bros., N. Y.

Ernest G. Brown

Coe Retires; Brown, Lovell Are Advanced

Ernest G. Brown, vice president, United States Rubber Co., has been elected also chairman of the board of directors of Texas-U. S. Chemical Co., New York, N. Y., succeeding John P. Coe, who retired June 30. Named to assume Mr. Brown's position as general manager of the mechanical goods division of U. S. Rubber is G. Allen Lovell, who was also elected a vice president.

Mr. Brown joined U. S. Rubber in 1929 in its central planning and engineering departments in New Haven, Conn., and became factory manager of the company's Bristol, R. I., plant in 1931 and production manager of the mechanical goods division in 1941. During World War II he served as general manager of the firm's munitions division and was made general manager of the mechanical goods division in 1944; he became a vice president a year later.

Mr. Lovell started with U. S. Rubber in 1918 as an apprentice in its Williamsport, Pa., plant, becoming manager of production control there by 1932. Later that year he transferred to the Mishawaka, Ind., plant and in 1936 joined the sales department of the footwear and general products division. He was named manager of coated fabrics sales in 1938, sales manager of foam rubber in 1944, sales manager of all manufacturers' products in 1949; and assistant general manager of the mechanical goods division in November, 1954.

BFG Tires Survive A-Test

Four six-ply trailer tires made by The B. F. Goodrich Co., Akron, O., survived undamaged the May 5, Yucca Flat, Nev., atom bomb test at between 10,000 to 15,000 feet from point zero, according to Harry A. Beeson, manager of tire compounding at the firm's Los Angeles, Calif., plant, who made the first preliminary inspection.

The tires were on a 35-foot Kit trailer coach, which itself sustained such damage as a splintered ceiling, dented walls, and smashed windows. The tires showed a normal Shore durometer hardness after the test, Beeson reported, exhibited no sign of injury or deterioration, and had not lost any air pressure. They were removed from the trailer for further study.

Voit Hose Indianapolis Standard

Flexible radiator hose made by W. J. Voit Rubber Corp., Los Angeles, Calif., was used in each of the entries at the thirty-ninth running of the 500-mile race at the Indianapolis Motor Speedway, the company reveals, adding that this is the fifth consecutive appearance of the hose in the contest. No failure in the hose has ever been reported.

Four pieces of the Voit hose in various lengths were used in most cars this year, compared to an average of two short pieces used in the 1953 race.

Other reasons for the popularity of Voit's hose, besides its proven dependability, are (1) its shock-absorbent qualities inherent through its accordion-like construction; (2) its flexibility; (3) its ease of installation; (4) its ability to go "around corners," and (5) its longevity and economy.

Markets Phillips 66 Tubeless

The Phillips 66 tubeless tire, said to offer greater blowout protection, a new tread design for increased anti-skid qualities, and improved sidewall and shoulder construction for better stability, has been introduced by Phillips Petroleum Co., Bartlesville, Okla. Philblack, the firm's furnace-type carbon black, was combined with Philprene, the firm's synthetic cold rubber, to increase the longevity of the tire, Phillips declares.

Truck Tubeless Standards Win Committee Approval

The standards committee of the Tire & Rim Association, Akron, O., has approved a technical standardization program on tubeless truck-bus tires and rims that is expected to be the go-ahead signal for manufacturers to proceed with tooling for volume production.

According to the Association, tubeless truck-bus tires will be made in sizes up to and including the tire that replaces the present 11.00 cross-section for mounting only on new type, one-piece drop center rims. In all sizes above the replacement for 11.00 cross-section, the multiple-piece rim, employing a sealing ring or gasket, will be used.

The announced program is a long step forward in bringing to the trucking industry the advantages of tubeless tires, the Association asserts. By eliminating the tube and flap and all troubles usually associated with them, one of the major sources of tire trouble will be permanently removed, the Association reports, adding that lighter weight, cooler running, and more trouble-free wheel assemblies can be expected.

Berea Installs Rubber Mill

A new 60-inch heavy-duty Farrel-Birmingham rubber mill has been installed at Berea Rubber Co., Berea, Ky., doubling the current milling capacity of the firm, according to Earl Hobein, resident manager. Installation of the equipment follows the recent completion of 2,200 square feet of factory floor space to provide additional stock compounding and mold repair facilities.

Purpose of the expansion program is to satisfy the mounting demand for O-ring compounds capable of performing at high temperatures, Hobein declares. The company supplies O-rings to the Parker Appliance Co., Cleveland, O.

Dayton Rubber's Freedlander Hopeful for Industry's Future

A. L. Freedlander (center) and R. William Patterson (right) exchanging symbolic key to the company's plant and testimonial scroll from the city of Dayton at the rubber firm's Golden Jubilee Banquet. Ohio Supreme Court Chief Justice Weygandt looks on

Optimism for the future of the synthetic rubber and synthetic resins industries was expressed by A. L. Freedlander, president of The Dayton Rubber Co., Dayton, O., at the firm's Golden Jubilee Banquet held in Dayton, May 17. He also predicted that his company would set a new sales record in 1955, exceeding the 1954 volume of $62,000,000.

Mr. Freedlander reviewed his firm's early role in the synthetic rubber industry when Dayton and other rubber companies formed the Copolymer Corp. of Baton Rouge, La., during World War II, which was run by the government until its recent passing into the hands of private industry. Cold rubber was an important new development at Copolymer, he reminded his audience.

Other Dayton contributions to American industry, including its huge production of V-belts and its polyurethane resins, were reviewed by Mr. Freedlander.

"There probably is not a textile mill in the world which does not use some of our products," he said, outlining the company's diversification of manufactured goods.

Guests present at the banquet included Christian Langaard, Askim Gummivarefabrik of Norway; Robert Badenhop, Robert Badenhop Corp.; S. C. Allyn, president, National Cash Register Co.; Carl V. Weygandt, Chief Justice of the Ohio Supreme Court; William G. Pickrel, secretary, Dayton Rubber Co.; F. F. Pfeiffer, president of the Dayton Chamber of Commerce; L. V. Baker, treasurer, Dayton Rubber Co.

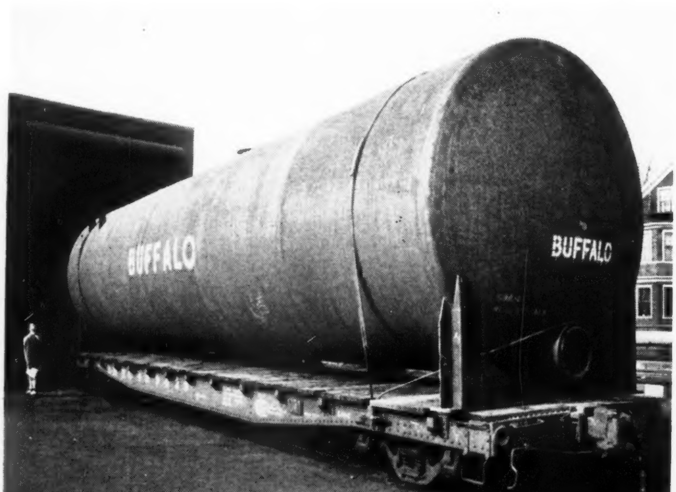
Also Harry Wolf, Wolf & Co.; H. S. Mooradian, vice president of production, Dayton Rubber Co.; R. William Patterson, Acting Mayor of Dayton; Herbert Starrick, City Manager of Dayton; Ray Crider, president, Local 178, United Rubber, Cork, Linoleum & Plastic Workers of America, CIO; and J. D. Grierson, representative of office employes, Dayton Rubber Co.

Tar Rubber for Jet Field

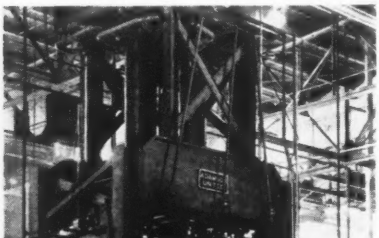
Tar rubber made by Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn., is being used in the construction of a new jet field at the Homestead, Fla., Air Force Base, according to Blaw-Knox Co., maker of the paving equipment used for the work.

One thousand feet of each end of the runways and the entire surface of the aprons will be covered with the material, which is resistant to jet fuel. The spillage of fuel is said to be normal in the operations of jet planes. The fuel is ordinarily detrimental to standard asphaltic concrete.

The design of the runways consists of a rock base, a 2½-inch compacted depth binder of asphalt, and a 1½-inch compacted depth tar rubber course. When completed in the fall, the jet field will reportedly have some of the longest runways in the world. More than 365,000 tons of asphaltic concrete and tar rubber will be required for the construction.



Shown awaiting shipment on a Providence, R. I., railroad siding is this 42,000-pound tank lined with 2,300 pounds of soft, white natural rubber at the Providence plant of United States Rubber Co. The tank was built by Buffalo Tank Co., Dunellen, N. J., for Monsanto Chemical Co., Kearny, N. J., and will hold food-grade phosphoric acid



Forming one-piece reinforced plastic boats on 700-ton press at Goodyear Aircraft

Goodyear Aircraft's New Plastics Line

Goodyear Aircraft Corp. recently completed the installation of five heavy-duty presses designed to form large reinforced plastic products. These presses, which range in size from 100 to 700 tons, are all hydraulically operated. Supplemental equipment includes preforming machines, ovens, mixers, and grinding booths.

Goodyear Aircraft has been producing optically clear canopies, in addition to a variety of reinforced plastics products, since 1945. With this new modern equipment, reinforced plastic items such as automobile bodies, boats, fuel tanks, missile and other complex aircraft components, farm implements, and a variety of other products can be produced on a mass-production basis.

The first job for the 700-ton press, obtained from Adamson United Co., was the production of one-piece hulls for outboard boats, to be marketed by Bowman, Inc., boat manufacturer of Little Rock.

The presses, which include three 300-ton units, and auxiliary equipment, cover an area of 25,000 square feet assigned by the company to the production of canopies and laminates.

Plymouth's one-piece plastic headliner as used in the 1955 Suburban station wagon

Plastic Headliner Good

The one-piece plastic headlining installed for the first time in the 1955 Plymouth Suburban station wagon has reportedly proved superior to the old-style cloth liner owing to the former's ease of cleaning and removal, insulating qualities, tear resistance, and the greater head room it affords.

Weighing just under 10 pounds, the liner is a high-impact thermoplastic technically known as a rubber-resin alloy. The mold for the liner was improvised by cutting the top off a Suburban at the belt line, filling it with plaster, and smoothing it down to the proper shape and contour. A plastic male mold was poured on to this base, which, in turn, was used to cast the female mold into which styling and color were incorporated.

Albert Koper

Gates Names Ad Firm

Gates Engineering Co., Wilmington, Del., producer of neoprene protective coatings in liquid and cold-bond form, has appointed Ross Roy, Inc., New York, N. Y., as its advertising agency for its current national expansion program.

Gates will soon introduce a new liquid neoprene called Gaco Roof for waterproof bonding of roof shingles and slate. The company is also a supplier of a broad range of vinyl coatings and linings and rubber-lined pipe joints and other equipment.

Markets New Atlas Tire

A premium safety tire using a new synthetic tread material, Viprene, and a new synthetic cord, Plycron, is being marketed throughout the Midwest by Standard Oil Co. (Indiana), Chicago, Ill. Called Atlas Premium Tubeless Tire, it is said to cost about twice the price of conventional tires and is being offered with a two-year guarantee.

According to Dwight F. Benton, Standard's vice president of sales, Viprene is the first synthetic rubber developed by private industry since the war, is five times more expensive than natural rubber, but gives 50% more mileage than the average tire.

The compositions of Viprene and Plycron were not revealed.

Develops Rosin Pellets

A free-flowing form of stabilized rosin that provides greater ease of handling than the solidified bulk in which the material was heretofore produced has been developed at the Battelle Memorial Institute, Columbus, O., at the request of G & A Laboratories, Inc., Savannah, Ga., manufacturer of the rosin.

Called Galex Pellets, the composition is based on an iodine-disproportioned rosin and is also stabilized against deterioration through oxidation. The pellets will not fuse at temperatures up to 130° F. or cake under pressure when bags of the material are stacked for storage, Battelle declares.

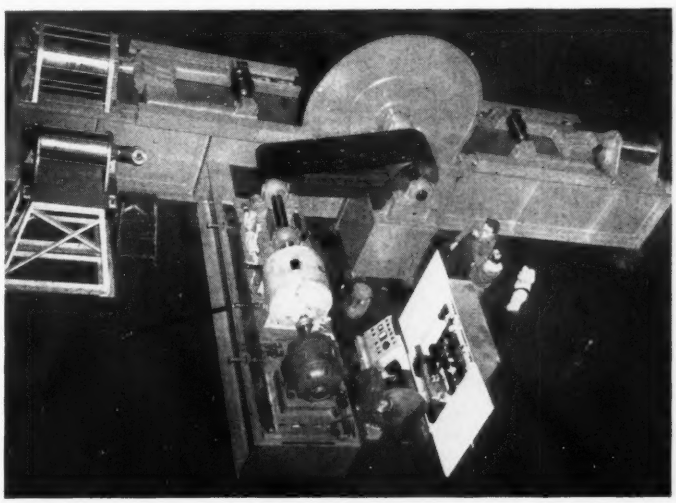
Various forms of rosin, products of the naval stores industry, are used in rubber compounding, varnishes, paper sizing, and pressure-sensitive tape.

National Rosin Oil Products, Inc., New York, N. Y., has been designated sole distributor of Galex Pellets.

Koper Named Office Head

Albert Koper, formerly Akron, O., technical sales representative for Harwick Standard Chemical Co., has been named resident manager of the firm's new office and warehouse in Albertsville, Ala., which will serve the Tennessee, Alabama, Mississippi, western Georgia, and Louisiana sales territories.

In announcing the appointment, Jack R. Moore, president of Harwick Standard, said, "Mr. Koper's training as a chemist and experience in general laboratory work, engineering, and production will give the south-central states ready access to valuable assistance on compounding and production problems."



Forty-ton airplane tire test wheel at the West Haven, Conn., plant of The Armstrong Rubber Co., which simulates airplane landings beginning with the touchdown speed of 250 miles an hour, and decelerating to a full stop in the required time. The wheel is said to be the only civilian device of its type in the country; the U. S. Air force has one like it at Wright Field, Ohio

News about People

Robert M. Morris, director of manufacturing for the organic chemicals division of Monsanto Chemical Co., St. Louis, Mo., has been granted a leave of absence to attend the fall session of the advanced management program at the Harvard University Graduate School of Business Administration.

Russell L. Bauer has been named process engineering supervisor for Mobay Chemical Co., St. Louis, Mo.

Harry L. Fisher, immediate past president of the American Chemical Society and professor of rubber technology at the University of Southern California, delivered an address on "The Synthetic Rubber Age" at the 1955 Northwest Regional Meeting of the Society at the University of Oregon, June 10.

Loren J. Sewall has been promoted to factory superintendent of Minnesota Rubber & Gasket Co., Minneapolis, Minn.

E. Ralph Rowzee, vice president and manager of Polymer Corp., Ltd., Sarnia, Ont., Canada, was awarded an Honorary Doctor of Science degree by Laval University at the thirty-eighth annual conference of The Chemical Institute of Canada held in Quebec, P.Q.

J. P. Haworth has been appointed assistant to the sales manager of the Butyl division of Enjay Co., Inc., New York, N. Y.

Raymond T. Bete has been advanced to development administrator for The Goodyear Tire & Rubber Co., Akron, O., and **C. M. Noble**, formerly manager of tire, tube, and rim manufacturing operations of the quality control division, succeeds him as director of quality control.

Donald L. O'Toole has been appointed special sales representative to the automotive industry for The Landers Corp., Toledo, O.

Max A. Minnig, executive vice president and director of sales of Witco Chemical Co., New York, N. Y., and **John A. White**, export manager of Witco Chemical Co., Ltd., London, England, have been elected to the board of directors of Witco Chemical Co., Ltd.

Roland Voorhees has been advanced to associate director of development for the chemicals and plastics division of Union Carbide & Carbon Corp., New York, N. Y.

Joseph F. Rives has been advanced to assistant to the vice president of the carbon black division, J. M. Huber Corp., New York, N. Y., and **Donald Thompson** has been promoted to packaging engineer. Both will make their headquarters at Borger, Tex.

Philip McLaughlin has been appointed assistant manager of sales development at Stauffer Chemical Co., New York, N. Y.

William P. Drake, executive vice president, Pennsylvania Salt Mfg. Co., Philadelphia, Pa., has succeeded **George B. Beitzel** as president of the firm. Mr. Beitzel will continue as member of the board of directors and will also serve as chairman of the board of Pennsalt International Corp., a subsidiary.

E. V. Osberg, president, National Polychemicals, Inc., Wilmington, Mass., has been appointed to the newly created post of historian of the Division of Rubber Chemistry of the American Chemical Society.

James H. Munger has joined the sales engineering staff of Automotive Rubber Co., Inc., Detroit, Mich.

Karl T. Zilch has been appointed to the research staff of Emery Industries, Inc., Cincinnati, O. Dr. Zilch was formerly with the oil and protein division of the Northern Utilization Research Branch of the United States Department of Agriculture.

Karl T. Zilch

Max A. Williams, for 23 years associated with American Mineral Spirits Co., Chicago, Ill., will retire October 31 as vice president and sales manager, remaining, however, a member of the board of directors and a consultant.

H. C. Milton has been appointed department manager, **R. L. Lambert** assistant manager, and **J. F. Allen** eastern regional sales manager for American Cyanamid Co., manufacturers chemicals department, industrial chemicals division, New York, N. Y.

Franklyn J. Emmett has been elected vice president, sales, of Tyer Rubber Co., Andover, Mass., and **Kenneth C. Bevan** has been chosen vice president, manufacturing. **Gordon L. Colquhoun** has been named assistant treasurer.

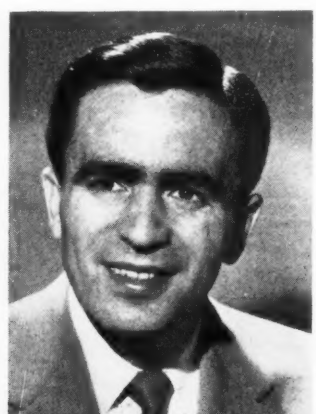
Fred J. Holzapfel and **Jack W. Graves** have been advanced to technical services superintendents of the John F. Queeny and William G. Krummrich plants, respectively, of Monsanto Chemical Co., St. Louis, Mo.

Robert B. Hamilton has been appointed general sales manager of foam rubber products for Hewitt-Robins, Inc., Stamford, Conn., succeeding **Howard D. Herbert**, who will retire.

J. W. Weir, Cleveland district manager of the industrial division, The Timken Roller Bearing Co., Canton, O., has retired after a 36-year association with the firm.

Harold L. Jungman has been advanced to eastern district sales manager of National Lead Co.'s Titanium Pigment Corp., New York, N. Y.

John D. Serpico has been appointed assistant manager of technical service at Marbon Chemical, division of Borg-Warner, Gary, Ind.



John D. Serpico

Pach Bros. N. Y.

Robert G. Kenly

Robert G. Kenly has been elected a vice president of New Jersey Zinc Co., New York, N. Y. He has been associated with the company since 1919.

Stanley O. Ames has been advanced to director of chemical research for Compo Shoe Machinery Corp., Boston, Mass., and its subsidiary, Compo Chemical Co., Inc., Mansfield, Mass.

John R. Swann has been appointed secretary-treasurer of Dunlop Canada, Ltd., Toronto, Ont., Canada. Also named were **W. R. Walton, Jr.,** to vice president; **G. F. Plummer,** to vice president of the automotive division; **H. S. Pritchard,** to vice president of the industrial and general products division; and **W. H. Bartlett,** to vice president of manufacturing.

William H. Bowman has been appointed assistant general manager of the organic chemicals division, American Cyanamid Co., New York, N. Y.

John F. Whitcomb has been advanced to general sales manager of the coated abrasives and related products division of Minnesota Mining & Mfg. Co., St. Paul, Minn., and **Richard L. Sheppard** has been promoted to general sales manager of the cellophane tape division.

Paul E. Jacobs has been advanced to manager of the central personnel department of The General Tire & Rubber Co., Akron, O.

Howard Hawkes, vice president, United States Rubber Co., New York, N. Y., has been named chairman of the rubber division of the 1955 Greater New York Fund campaign.

Raymond W. Balint has joined The Goodyear Tire & Rubber Co., cords and fabrics research section, Akron, O.

Barefoot—Robt. Simpson Co.

Joseph W. Holmes, Jr.

Warren Kay Vantine

Stanley O. Ames

Willard Stewart, Inc.

R. Scotton Griffin

Joseph W. Holmes has been named sales manager of American Synthetic Rubber Corp., New York, N. Y. He was formerly associated with Polymer Corp., Canadian Industries, Ltd., and Jefferson Chemical Co. Mr. Holmes has had wide marketing experience with GR-S and Butyl rubber on this continent and in Europe, having been manager of sales and technical service and executive assistant to the president and managing director of Polymer Corp.

J. R. Durland and **R. S. Wobus** have been promoted to the positions of technical production managers for Monsanto Chemical Co., organic chemicals division, St. Louis, Mo., and will be replaced as John F. Queeny plant manager and William G. Krummrich plant manager, respectively, by **Howard L. Minckler** and **Joe Cresce.** **Robert E. Soden,** formerly technical service superintendent at the Queeny plant, has been advanced to plant manager of the Nitro, W. Va., plant, and **Dominic Danna,** formerly production superintendent at the Avon, Calif., plant, has been advanced to plant manager there.

Howard A. Stockwell, Jr., has been named advertising and sales promotion manager of Tyer Rubber Co., Andover, Mass.

Charles E. Stonebraker has been appointed manager of sales and commercial accounting for The B. F. Goodrich Co. Industrial Products Division, Akron, O.

Ralph Perkins, Jr., has been appointed sales representative for the tire yarn division of Industrial Rayon Corp., Cleveland, O.

William V. Sauter, Jr., has been advanced to assistant sales manager for neoprene of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and is succeeded as promotional salesman in Wilmington by **R. Scotton Griffin.**

Willard Stewart, Inc.

William V. Sauter, Jr.

Robert C. Toth

Robert C. Toth, a full-time member of our editorial staff until September, 1954, and a contributing editor from September, 1954, to June, 1955, while attending the Graduate School of Journalism at Columbia University, won one of the School's Pulitzer Traveling Scholarships in May. He will be a reporter on the staff of the *Providence* (*R. I.*) *Journal* until he and his wife sail for Europe in the fall.

C. C. Gibson, manufacturers sales department of The Goodyear Tire & Rubber Co., Akron, O., has been named assistant to the vice president and is succeeded as department manager by **C. H. Bruns,** formerly account executive in manufacturers sales, whose duties have been assumed by **C. A. Bethel, Jr.,** heretofore assistant district manager in Sacramento, Calif. Also advanced was **R. F. Tomkinson,** automotive products department, Detroit, to account executive, manufacturers sales. **R. S. Burnham,** consultant to the manufacturers sales department, has retired after 44 years of service with the company. Also retired was **M. W. Henry,** senior staffman and associated with Goodyear for 42 years. **D. W. Hardman,** formerly of the government sales department, replaces him.

Robert J. Musser has been appointed assistant manager of the market research department of Carbide & Carbon Chemicals Co., division of Union Carbide & Carbon Corp., New York, N. Y.

George Wash has been advanced to director of the plastics sales division of Phillips Chemical Co., subsidiary of Phillips Petroleum Co., Bartlesville, Okla. He has been associated with the parent company since 1946.

George M. Riveire, Goodyear Tire & Rubber Co., has been reelected president of the Washington Post of the American Ordnance Association. **W. J. Sears,** The Rubber Manufacturers Association, Inc., has been named second vice president.

Robert M. Hopkins and **Richard J. Jones** have been added to the southeastern sales staff of Diamond Alkali Co., Cleveland, O., and **Charles P. Egolf** has been transferred to the Memphis sales office.

C. C. March has been named general manager of the coated abrasives and related products division of Minnesota Mining & Mfg. Co., St. Paul, Minn., and **R. W. Mueller** has been named general manager of the fibrous and industrial tape division. Three vice presidents of the company have been given expanded responsibilities, including **Clarence B. Sampair,** now in charge of the tape and ribbon products group; **Joseph C. Duke,** who assumes charge of the adhesives and coating division; and **Hubert J. Tierney,** who will head the newly formed plastic division and has been named chairman of the tape planning committee.

L. G. Murray has been advanced to manager of export sales for Aetna-Standard Engineering Co., Pittsburgh, Pa. Also promoted was **A. J. Morgan,** to manager of sheet and strip equipment.

Frank W. Telford, a 44-year sales veteran with The Goodyear Tire & Rubber Co., Akron, O., 38 years of which have been with the firm's Detroit, Mich., manufacturers sales office, has retired. To his Detroit associates, Mr. Telford is known as the dean of manufacturers representatives.

Philip M. Dinkins has been elected vice president of operations for the dyestuff and chemical division of General Aniline & Film Corp., New York, N. Y.

Wallace E. Brimer has been elected president and treasurer of Tyer Rubber Co., Andover, Mass. **Hugh Bullock,** president of the firm since 1935, has retired, but will remain a director. He is currently a director of The Rubber Manufacturers Association, Inc.

Wallace E. Brimer

Oliver M. Hayden

Oliver M. Hayden, assistant director of sales, elastomer division, E. I. du Pont de Nemours & Co., Inc., was awarded the honorary degree of Doctor of Science by his Alma Mater, Clark University, Worcester, Mass., on June 5, for "creative work in chemistry." In June, 1954, Mr. Hayden was presented an award of merit by the American Society for Testing Materials for his contributions to the Society's work on rubber and for his four years' service as chairman of Committee D-11.

Emert S. Pfau has been advanced to technical director of the chemical division of The General Tire & Rubber Co., Akron, O. He was formerly head of the polymerization group of the firm's research division.

Charles A. Lindsay has been advanced to general manager of the container division of Stauffer Chemical Co., New York, N. Y.

Thomas D. Cabot, president of Godfrey L. Cabot, Inc., Boston, Mass., has been elected a director of the Committee for a National Trade Policy and a trustee of the Committee for Economic Development.

Perry S. Odell has been appointed head of the rubber purchasing division of United States Rubber Co., New York, N. Y.

Raymond L. Gassell has been promoted to divisional chief plant engineer for the organic chemicals division of American Cyanamid Co., New York, N. Y.

Richard A. Briggs has been promoted to head of polymerization research on olefinic materials for The General Tire & Rubber Co., Akron, O.

Herbert M. Kelton, treasurer of United States Rubber Co., New York, N. Y., has been elected assistant treasurer of the Controllers Institute of America.

George J. Barron, Jr., has been transferred to the process engineering section, research division, of The Goodyear Tire & Rubber Co., Akron, O.

W. A. Raimond has been appointed assistant technical director of the organic chemicals division of American Cyanamid Co., New York, N. Y., and **A. G. Hill** has been named resident technical director at the division's Bound Brook, N. J., plant. Also advanced, to division development managers, were **R. C. Conn,** dyes and textile resins; **R. H. Ebel,** rubber chemicals; **W. P. Munro,** vat dyes and vat dye intermediates; and **W. E. Sisco,** coal-tar chemicals.

Frank L. Shew has joined the office of the chief of rubber laboratories, United States Navy, Bureau of Ships, Washington, D. C.

W. C. Walker has been named assistant to the vice president in charge of advertising and public relations of Witco Chemical Co., New York, N. Y.

G. W. Van Cleve has been appointed vice president and general manager of Allied Scientific Products Co., Culver City, Calif., while continuing as sales manager for Stillman Rubber Co., Los Angeles, Calif.

John F. Ewert, Jr., has joined Gates Engineering Co., Wilmington, Del., as director of advertising and sales promotion.

Arthur B. Warner has been promoted to chief engineer for Minnesota Rubber & Gasket Co., Minneapolis, Minn.

Claude E. Davis has been appointed manager of packing and special products sales for The Goodyear Tire & Rubber Co., Akron, O.

MCA Officers

(Continued from page 493)

president, Union Carbide & Carbon Corp., and J. Albert Woods, president, Commercial Solvents Corp., as vice presidents of the Association; and M. F. Crass, Jr., as secretary-treasurer.

Elected directors were Elton W. Clark, vice president, Allied Chemical; Ernest Hart, executive vice president, Food Machinery & Chemical Corp.; John A. Hill, president, Air Reduction Co., Inc.; John E. McKeen, president, Charles Pfizer & Co., Inc.; George L. Parkhurst, board chairman, Oronite Chemical Co.; Robert B. Semple, president, Wyandotte Chemicals Corp.; Kenneth C. Towe, president, American Cyanamid Co.; O. V. Tracy, president, Enjay Co., Inc.; Robert I. Wishnick, president, Witco Chemical Co.; and Thomas S. Nichols, president, Olin Mathieson Chemical Corp.

News Briefs

C. K. Williams & Co., East St. Louis, Ill., manufacturer of iron oxide pigments, has chosen four new directors, including R. A. Stephens, director of research; E. H. Green, general sales manager; J. S. Googins, general production manager; and W. N. Crumpler, western division sales manager. Then the directors at their meeting elected the following officers, who also constitute the balance of the directorate: board chairman and treasurer, Morris R. Williams; president, L. K. Ayers; vice presidents, J. W. Ayers, R. W. Dodson, and J. W. Schlosser; secretary, E. G. Davies.

Sharples Chemicals Division, Pennsylvania Salt Mfg. Co., has moved its headquarters to 3 Penn Center Plaza, Philadelphia 2, Pa.

The Goodyear Tire & Rubber Co., Akron, O., has presented the Litchfield Award of Merit to three of its employes, called the firm's best salesmen in their respective fields for 1954. They are Julius A. Lucas, manager of automotive products sales, Detroit; Weldon R. Ramzy, district store supervisor, New Orleans; and Joseph S. Hlass, store manager, Greenwood, Miss.

Allied Chemical & Dye Corp., nitrogen division, New York, N. Y., is offering free a pocket-size ammonia leak detection device, a booklet containing phenolphthalein-impregnated paper strips.

Tyson Corp., Woodbridge, N. J., has appointed C. P. Hall Co. sales agent east of the Rocky Mountains for its vulcanized vegetable oils and specialty products for the rubber industry.

Diamond Alkali Co., Cleveland, O., has put into operation at its Painesville, O., works a new installation for producing chromic acid, said to be the first completely integrated facility of its kind in mid-America.

American Synthetic Rubber Corp., with its main plant and general offices at Louisville, Ky., has opened administrative and sales offices at 500 Fifth Ave., New York, N. Y., where Bancroft W. Henderson, president, will have his offices.

The Timken Roller Bearing Co., Canton, O., has received a citation from the American Society for Materials Handling for the best installation of a materials handling system in production in northeastern Ohio.

Hercules Powder Co., Wilmington, Del., has established a new rubber chemicals sales office at Beaumont, Tex., serving Texas, Louisiana, and California, with Wilfred E. Osberg, Jr., as manager.

Flightex Fabrics, Inc., New York, N. Y., is offering a new Swatch Folder containing samples of the company's industrial tapes and fabrics, including fabrics of glass, cotton, vinyon, dynel, and orlon.

The B. F. Goodrich Co., Akron, O., is employing in its airplane wheel and brake plant an electronic brain, known as an analog, which predicts through heat simulation the increasingly high temperatures that aircraft brakes must absorb on faster airplanes now in the design stage. The device is thus assisting in the development of new brake materials and designs.

Hale & Kullgren, Inc., Akron, O., designer of machinery and processes for rubber and plastics, has appointed O'Connor & Co., Inc., Chicago, Ill., as western sales representative.

Wheelco Instruments Division, Barber-Colman Co., Rockford, Ill., has completed a four-week series of sales clinics on automation for all of its branch office personnel.

Oakite Products, Inc., New York, N. Y., has formed the Oakite export division to handle distribution of the firm's products abroad. Harry V. Kerker has been named manager.

The Dayton Rubber Co., Dayton, O., has appointed Imperial Foam Rubber Corp., Long Island City, N. Y., distributor of its Koolfoam "Air-Conditioned" Cushioning.

The General Tire & Rubber Co., Akron, O., has been awarded the George Washington Honor Medal by the Freedoms Foundation of Valley Forge for its presentation of "Ace of Aces," a dramatization of the life of Eddie Rickenbacker, and what the Foundation called the best 15-minute filmed television documentary of 1954.

The Goodyear Tire & Rubber Co., Akron, O., expects to raise approximately $50,000,000 in additional capital funds through its forthcoming offering to owners of its common stock of one share for every 10 shares held.

Diamond Alkali Co., Cleveland, O., has announced plans for the administrative absorption of The Buckeye Soda Co., Painesville, O., a Diamond subsidiary since 1923 and producer and packager of chemical specialties for the grocery, the drug, and the industrial maintenance supply fields.

American Mineral Spirits Co., Western, Los Angeles, Calif., has elected J. A. Bartlett, a company director since 1947 and vice president of the company's New York branch, president to succeed M. A. Williams, who has retired. A. J. Falkenberg and Ethan B. Higgins were elected vice presidents.

Marbon Chemical Division of Borg-Warner Corp., Gary, Ind., has begun preliminary engineering work on its recently acquired site of land at Washington, W. Va., in anticipation of the locality's future development.

Anaconda Wire & Cable Co., New York, N. Y., has developed a new shuttle-car cable for mining operations, called Security-flex and made of neoprene insulation and jacket and nylon breaker strip that are said to make it heat-, flame-, and puncture-resistant.

Monsanto Chemical Co., plastics division, Springfield, Mass., and a Monsanto associate company, Shawinigan Resins Corp., will construct additional facilities at Trenton, Mich., for the manufacture of Butvar, a polyvinyl-resin base material, and its conversion into Saflex safety glass interlayer.

The Goodyear Tire & Rubber Co.'s Hartford, Conn., sales and operating personnel have moved to a newly built district warehouse and office building at 180 Goodwin St., East Hartford.

Carbide & Carbon Chemicals Co., New York, N. Y., has announced the availability of a free-flowing pellet form of Carbowax polyethylene glycol 20M, a polyethylene glycol with a molecular weight of about 20,000 that is said to show promise as a release agent for rubber where intricate molds require a viscous lubricant.

Great American Industries, Inc., Meriden, Conn., manufacturer of cellular rubber and plastics products in its Rubatex Division, Bedford, Va., has acquired The Colson Corp., Elyria, O., material handling manufacturer.

Arthur R. Plank has joined Fargo Rubber Co., Los Angeles, Calif.

B. F. Goodrich Chemical Co., Cleveland, O., reveals that its Hycar American rubber is being used to make the spirally grooved rolls on a new 120-copies-per-minute duplicating machine, called the Conqueror, manufactured by the Heyer Corp., Chicago, Ill.

Obituaries

George M. Miller

George Mathias Miller, long-time executive of Turner Halsey Co., New York, N. Y., and an outstanding figure in the textile industry, died of a cerebral hemorrhage on April 24. Funeral services were held April 26 at Manhasset, L. I., and interment took place the next day at Ferncliff Cemetery, Hartsdale, N. Y.

Mr. Miller was born in Brooklyn, N. Y., on July 18, 1887. He attended grade and high schools and night college courses.

The deceased began his business career in 1904 in a clerical capacity for the wholesale dry goods firm of James H. Dunham & Co. in New York. Then, in 1906, he went to the dry goods commission house of J. Spencer Turner Co. When Turner Halsey Co. was organized in 1908, Mr. Miller was on its staff and advanced from a clerical position to salesman and then head of the converting department. Within three years of the formation of the firm Mr. Turner died, and Mr. Miller gradually took over his responsibilities, working for many years as Mr. Halsey's chief active associate.

In 1920, Mr. Miller was elected vice president of the firm; in 1924, president of Harlomoor Co., an incorporation of the company's converting business; in 1930, president of Turner Halsey Co., and in 1951, chairman of the board. He was, besides, a director of Mt. Vernon-Woodberry Mills, Arcade Cotton Mills, and Carhal Factors.

Mr. Miller also held memberships in Union League, Sands Point Beach, North Hills Golf, and Arkwright clubs and was on the board of governors of the Merchant Club. He was also very active in the Textile Merchants Association.

Survivors include the widow, two sisters, and a brother.

William M. Mettler

William M. Mettler, assistant secretary of The Goodyear Tire & Rubber Co., Akron, O., and associated with that firm for 39 years, died suddenly at his home, June 7.

He was born in Kalispell, Mont., February 21, 1892. Mr. Mettler attended the University of Montana and Yale University, graduating from the latter in 1915. He subsequently obtained a degree in law from Cleveland Law School.

Before joining Goodyear in 1916, he was sales manager for Rand Systems Corp., now Remington Rand, Inc. He rose at Goodyear from the firm's credit department to assistant to the secretary in 1920 and was appointed assistant secretary in 1926.

He held memberships in Sigma Chi fraternity, Executives Club, and the Pomona Grange of Summit County, O. He was also a member of the board of trustees of Akron YMCA, Family Service Society, and United Community Chest of Akron, Inc., and a member of the executive committees of the Bath Grange and Bath Community Council. He was active in the affairs of the Bath Church, having served as deacon, trustee, and chairman of the board.

He is survived by his wife, four daughters, and two sons.

Financial

S. S. White Dental Mfg. Co., Philadelphia, Pa. Quarter ended March 31, 1955: net profit, $143,057, equal to 39¢ a share, against $127,020, or 34¢ a share, in the 1954 period.

United Carbon Co., Charleston, W. Va. Three months ended March 31, 1955: net profit, $1,269,614, equal to $1.06 a share, compared with $1,029,681, or 86¢ a share, in the preceding year's quarter.

Union Asbestos & Rubber Co., Chicago, Ill. January 1-December 31, 1954: net profit, $336,716, equal to 71¢ a share, against $164,736, or 35¢ a share, a year earlier.

First quarter, 1955: net profit, $34,002, equal to 7¢ a share, against $107,339, or 22¢ a share, in the like period last year.

U. S. Rubber Reclaiming Co., Buffalo, N. Y. First quarter, 1955: net earnings, $60,573, contrasted with net loss of $57,232 a year earlier.

The Timken Roller Bearing Co., Canton, O. Quarter ended March 31, 1955: net earnings, $4,990,695, equal to $2.06 a share, compared with $3,012,580, or $1.24 a share, in last year's quarter.

Thiokol Chemical Corp., Trenton, N. J. First quarter, 1955: net profit, $115,000, equal to 32¢ a share, against $52,830, or 15¢ a share, in the same period last year.

Thermoid Co., Trenton, N. J., and subsidiaries. For 1954: net profit, $962,617, equal to $1.06 each on 800,000 common shares, compared with $813,340, or 87¢ a share, the year before; net sales, $30,510,-760, against $36,747,012; income taxes, $1,145,600, against $1,833,736; current assets, $13,196,717, current liabilities, $4,139,951, against $13,761,178 and $4,929,085, respectively, the end of '53.

First quarter, 1955: net income, $236,-490, equal to 26¢ a share, against $180,-900, or 29¢ a share, in the '54 period; sales, $8,676,501, against $8,309,495.

News from Abroad

India

Rubber Industry Gaining

Both the rubber planting and rubber manufacturing industries in India have been progressing in recent years, though the increase in the output of raw rubber has not kept pace with the growth of consumption. At the end of 1953 the area under rubber came to 173,643.58 acres, distributed among 254 estates of more than 100 acres, with a total area of 102,243.03 acres, and 14,176 smallholdings, with total area of 71,400.55 acres. Twenty-four estates cover more than 1,000 acres each, and no fewer than 2,427 smallholdings are of less than one acre. Rubber growing is concentrated mainly in the State of Travancore, which has 123,554.24 acres under rubber, including more than 96% of the smallholdings and 60% of the estates; a further 25% of the estates are in Malabar.

Production increased slowly in the period 1948-1950, from 15,422 to 15,599 tons, but at an accelerated pace in the succeeding years, rising to 21,136 tons in 1953; in the first 10 months of 1954 output was 16,443 tons, about the same as in the preceding year. Yield is low, averaging about 280 pounds per acre per annum. Efforts are being made, however, to raise output by budgrafting and breeding.

The Indian Rubber Board reports that in 1953 and 1954 several high-yielding trees on four estates were under observation, and 35 mother trees were finally selected for budgrafting and testing of clones. In addition, hand-pollination on 18 foreign and one Indian clone was carried out in the first organized experiment of this kind undertaken by the Board.

The Indian rubber planting industry will also be aided by the establishment of a small rubber research institute which has been approved by the government. The research institute, to be set up in South India, will concentrate on botany, agronomy, pathology, and chemistry; connected with it will be a small experiment station for field research.

Rubber Manufacturing

The Indian rubber manufacturing industry now counts 100 medium and large factories and almost 300 small units, mostly working on a cottage industry basis, we learn from the special issue of September, 1954, of the *India Rubber Bulletin* issued by the Association of Rubber Manufacturers in India. The main sections of the industry are: tires and tubes, rubber-covered cables, and general and mechanical goods including proofed fabric, sheeting, hose, belting, sponge and latex foam, dipped goods, toys and balloons, rubber flooring, and surgical goods.

For many items, actual production is below installed capacity, and manufacturers understandably urge the government to adopt measures to aid the industries involved. This condition is true for rubber ply transmission and conveyor belting and various types of V-belts, and manufacturers want import prohibition of all except fractional horse-power and E-section V-belts. In the case of waterproof fabrics, the idle capacity of about 64% is due to large-scale expansion during World War II to meet huge military demands, and a rise in the standard of living would more than absorb this idle capacity, it is held.

Production of ply-construction rubber hose covers home requirements; improved types of braided hose and molded hose for pneumatic tools and spraying are expected before long to be available in sufficient quantity for home needs.

In 1953 production included among others the following:

Tires	
Automobile, *units*	767,600
Cycle, *units*	4,645,000
Tractor and airplane, *units*	10,907
Tubes	
Automobile, *units*	658,200
Cycle, *units*	4,590,600
Tractor and airplane, *units*	8,656
Rubber footwear, *prs.*	23,880,000
Insulated cables, *yds.*	48,440,000
Waterproof fabric, *yds.*	2,069,000
Latex foam sponge, *lbs.*	495,900
Dipped rubber goods, toys, balloons, etc., *doz.*	13,270,000

The footwear industry not only covers all Indian demands so that there have been no imports of rubber shoes since 1951, but for years there has been a good surplus for export; in 1953, 2,760,530 pairs of shoes, mainly rubber, were exported.

Local Consumption

As already mentioned, rubber consumption has been increasing more rapidly than production, amounting in 1953 to 22,373 tons and to 21,035 tons in the first 10 months of 1954; consequently local output of rubber must be supplemented by imports of raw rubber, which, incidentally, fluctuate widely from year to year. Thus they were 6,921 tons in 1951, dropped to 272 tons in 1953, and rose again to 3,162 tons in the 1954 period.

Not so long ago practically all South Indian rubber was exported, but in the last half dozen years or so, rubber exports have dwindled rapidly, and none were listed for January-October, 1954.

In addition to natural rubber, India has also been importing increasing quantities of neoprene and nitrile rubbers and, more recently, some silicones and butyl, mostly from the United States. It is suggested that India may turn to Britain for synthetic rubber when production there gets under way to avoid currency difficulties connected with imports from the United States, and at the same time increase purchases. It is hinted that India may also examine the possibility of making her own synthetics from domestic materials.

Imports, mainly from the United States, also supply most of the compounding ingredients used; but the urge to be self-sufficient is felt here too, and attempts are being made to utilize local materials in the production of various substances. Very small amounts of SRF carbon black are already being made, and a pilot plant for making black from mineral oils is under way, while the establishment of oil refineries in India is expected to be of further aid in providing locally produced carbon black.

In the same way, it is hoped that the proposed establishment of local dyestuff factories may pave the way for the production in India of accelerators, antioxidants, and other special materials.

The local industry uses about 1,200 tons of reclaimed rubber annually, practically all of which is imported, except for a small amount made by a few of the larger rubber manufacturing companies. Latest reports indicate that the Indian Rubber Industries Association in the Bombay area is seeking American assistance in setting up a reclaim plant with capacity of 150 tons monthly. The Association would like Americans to participate in this venture to the extent of supplying necessary machinery and possible technical assistance.

Ceylon

Rubber-Rice Pact To End

Burma is prepared to enter a rubber-rice trade agreement with Ceylon similar to that between Ceylon and China, but will make easier terms, the Burmese premier is quoted as telling the Ceylon premier. But first a few things would have to be ironed out, it seems; thus Ceylon's pact with China would have to be revoked, which would be to Ceylon's advantage, Burma has pointed out, since she could then get from the United States the aid now denied by the Battle Act. Whether Ceylon is prepared to go the length of cancelling her agreement with China or not, it is at least certain that Ceylonese shippers and producers have been urging its revision. The pact with China permits revision if the price for a period of one month is higher than 27d. per pound, the price contracted for this year. Ceylon has

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already sent China 20,000 tons on the present contract and has 30,000 tons more to ship at a rate that could involve a substantial loss.

At the same time Ceylonese merchants are understood to be urging that the trade with China be made free. They claim that government handling of inquiries from China for Ceylon commodities has not been satisfactory, and that if it were left to them, it would be possible to export other products to China besides rubber and coconut oil. Meanwhile it is learned that China made no further inquiries from Ceylon during the last two months of 1954 for either crepe or coconut oil, considerable quantities of which had been ordered earlier in that year.

Malaya

Replanting Scheme Problems

The government's replanting scheme, involving the expenditure of $280,000,000 over a period of 11 years to help smallholders and estates ($112,000,000 of the total will go to the former, and $168,000,000 to the latter) has been duly approved by the Legislative Council, and the Rubber Industry (Replanting) Fund Ordinance has been amended accordingly. The most important task of the government will now commence—that is, the actual spending of the money, and discussions with the different sections of the rubber industry on carrying out the scheme will soon start.

With regard to the smallholder, various suggestions are already being offered. As we have mentioned before in these columns, the smallholder replanting scheme started a few years ago has been lagging. At the end of 1954, smallholders appear to have made preparations for replanting only 60,000 acres out of the total of 90,000 acres that was the target for both 1953 and 1954; the target for 1955 was 60,000 acres, but it is already clear that it will not be reached.

The original replanting grant of $400 per acre to smallholders has been raised to $500, but in some quarters this is still considered insufficient, and a further increase has been suggested—which the administrators of the smallholders' fund oppose. But smallholder replanting must be speeded up, and some experts are inclined to believe that this end could be furthered by starting large cooperative schemes both for replanting and—where practical—new planting.

The Emergency and Rubber Thefts

That the Emergency is still a serious matter in Malaya seven years after its existence was first officially recognized finds confirmation in the annual report for 1954 of the United Planting Association of Malaya. Some improvement has undoubtedly been achieved by government measures, but there are still "black" areas, and the opinion of those who have to work and live there is that though the number of incidents has decreased, ambushes and outrages by terrorists are now better organized. The continued activity by terrorists, furthermore, implies that they can still count on a sufficiently large number of sympathizers and persons who are more afraid of them than of the Malayan Government, to supply them with food and money.

It has long been held by the Association that funds are largely derived from the sale of stolen rubber. The government has now come to the same conclusion, and the problem of rubber thefts from estates—which since the rise in the price of rubber have been assuming proportions reminiscent of those reached in 1951-52—is to be tackled by a special working party consisting of representatives of the Federation's Economic Division of the Treasury, the police, and the rubber industry. For the present it seems, legal means to make it harder to steal rubber are being considered.

Fear African Competition

The prospect of intensified competition from synthetic rubber in the United States has alerted certain political parties in Malaya to what they insist will become a threat from new natural rubber developments outside the established plantation rubber areas in Asia. They have in mind particularly the setting up of rubber estates in Africa with high-yielding stock exported from Malaya. Some time ago these persons protested to the Malayan Government on this score, but without success, and apparently they are preparing to work on the present government to ban these exports. To the argument against their protest, that even if Malaya did not supply the improved rubber material, Ceylon and Indonesia could and would do so, they reply that these countries would eventually have to follow Malaya and ban such exports in their own interests.

Rubber Planting Notes

In 1954 the Rubber Research Institute of Malaya set up a trial planting of another 216 clones from imported seedlings. The clones were prepared from seedlings of *Hevea brasiliensis* from Brazil and Peru, *Hevea benthamiana* from Brazil, and from a clone resistant to South American leaf blight. The Institute now has 25 Brazilian clones resistant to this disease, having received eight more clones recently via Florida. In exchange for these, 25 Rubber Research Institute clones were sent to the Instituto Agronomico do Norte, Brazil.

The Planters' Bulletin for May, 1955, notes that *Hevea* plus M—the new rubber produced by the BRPRA by grafting methylmethacrylate to natural rubber—can be prepared simply in Malaya from fresh latex.

Last year a series of new families of legitimate seedlings was obtained by the RRI from 6,500 hand pollinations, representing 12 different clones.

Cost of Producing Natural Rubber

On the face of it, the natural rubber industry seems to be more favorably placed than the synthetic rubber industry as far as initial capital requirement is concerned, T. B. Barlow, chairman of Highlands & Lowlands Para Rubber Co., said recently while speaking on the outlook for natural rubber. A synthetic rubber plant to be built in South Wales with initial annual output of 6,000 tons, rising to 10,000 tons later, he said, quoting a recent news item, will cost £2,000,000, or £200 a ton of synthetic rubber. This sum (£200), however, should provide for production capacity of 3,000 pounds (1.34 long tons) of natural rubber. But a synthetic plant could probably be built and brought to production in two years; whereas natural rubber requires at least five years.

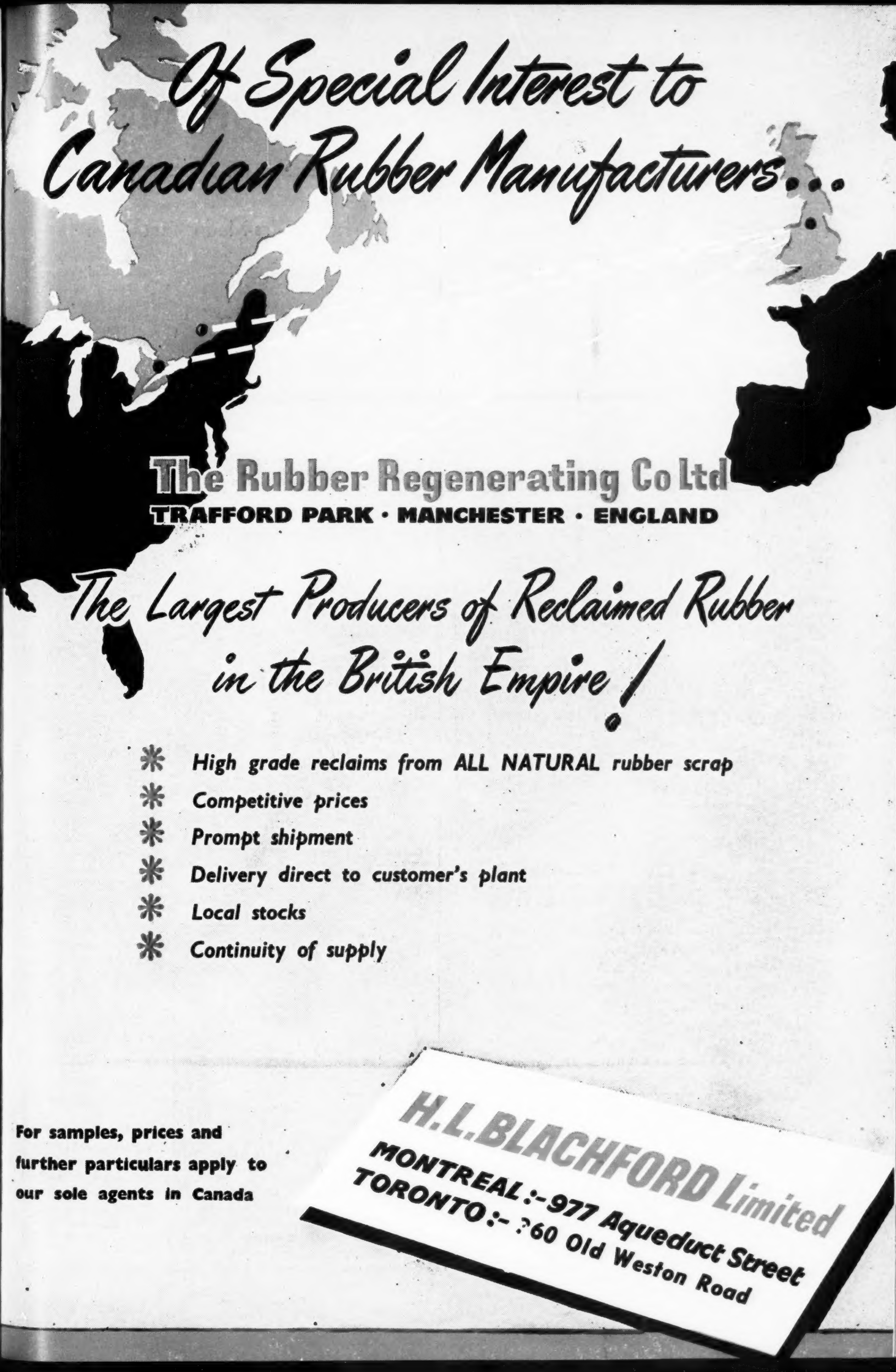
Statements about estate production costs of less than a shilling a pound may easily be misleading, he continued. Thus his own company's production costs of 10.8d. referred only to estate expenditure and did not cover export duty and cess of 1.54d., depreciation 3.01d., freight and selling charges 0.88d., London expenses 0.27d., and replanting 1.5d., which brought the actual final cost to a total of 18d. per pound c.i.f.

France

Effect of Coagulating Salts on Dipped Goods

Systematic tests were undertaken at the Institut Français du Caoutchouc by A. Thorsud[1] on the influence of the anion and the cation of coagulating salts on the properties and aging of dipped goods. For the study of the anions alone, they were introduced in the latex in the form of aqueous solutions of ammonium salts; for salts of divalent cations, samples were prepared by dipping the mold into a vulcanizable latex mix, next into a solution of the coagulating salt, and then into a latex bath identical with the first; this step was followed by drying and curing. Work centered chiefly on cations of the chlorides and nitrates of barium, calcium, and zinc. The results indicated that the presence of a salt greatly retards vulcanization; cations have a more marked effect in this respect than the anions; resistance to rupture is much reduced, especially in the case of the salts of divalent cations. In general, aging is adversely affected by all salts, but the chlorides are more destructive than the acetates; while the nitrates are distinctly less harmful than either.

[1] *Rev. gén. caoutchouc*, 31, 12, 977 (1954).



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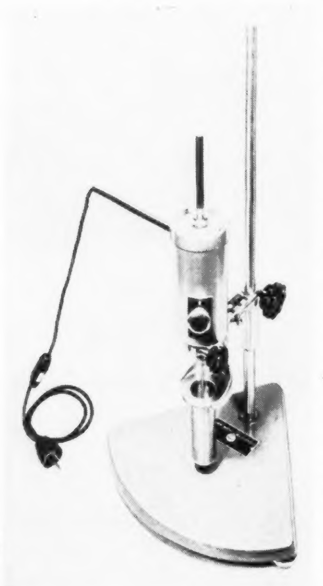
NEW EQUIPMENT

Drage Swiss-Made Viscometer



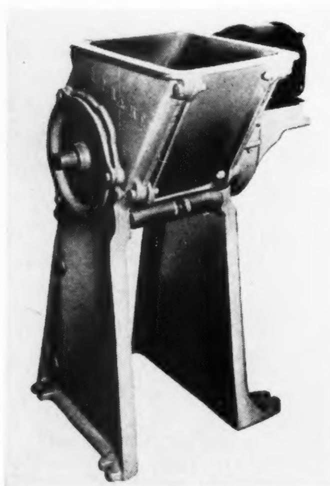
"Viscostructure" STVK

A new Swiss-made viscometer, not only designed to give specific values for rheological characteristics such as thixotropy, dilatancy, and yield value, but that also will accurately detect the relation of time and temperature to these flow properties, has been introduced by Drage Products, Inc., Union City, N. J.

Available in two models designated "Viscostructure" and "Viscotemp," the instruments are said to be capable of operation under extremes of pressure and temperature at shear rates up to 600 sec^{-1}. Shear rates as high as 40,000 sec^{-1} are claimed possible with special equipment.

Other features include a dampening control knob that enables readings to be taken at a thixotropic level, spindles that have special ball and socket joint with a double keyway that eliminates slack and makes it impossible to obtain higher scale values due to schlieren, and the stationary and visible dial.

Dry Ice Crusher



Supreme Dry Ice Crusher

A machine for crushing dry ice, the Supreme Dry Ice Crusher, has been placed on the market by Franklin P. Miller & Son, Inc., East Orange, N. J. Dry ice, mixed with newly manufactured plastic and rubber parts in a tumbling barrel, is valuable in the polishing and removal of flash from such parts; imperfections harden and abrade off; and the dry ice evaporates.

Capable of adjusting the size of the dry ice particles for different sizes and compositions of parts, the crusher accommodates a full 50-pound standard block of dry ice and operates at a rate of 2-4 tons of ice per hour. Powdered dry ice can also be produced.

The machine is powered by a 1½-hp. motor through built-in direct gear reduction drive, occupies a floor space of 20 by 22 inches, and weighs 325 pounds.

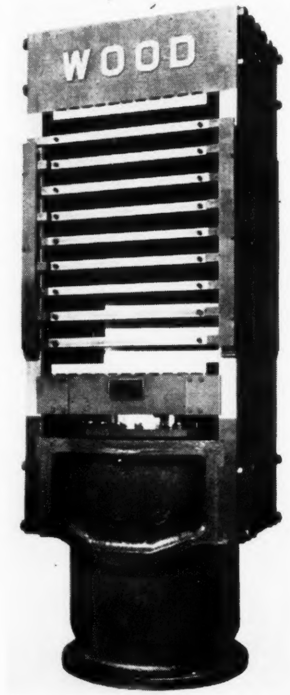
Other uses for crushed dry ice in the plastic and rubber in-


VINYL COMPOUNDS
Custom Mixed by
CARY CHEMICALS

dustries include embrittlement for pulverizing, as moisture traps in vacuum systems, and for environmental testing.

1,100-Ton Capacity Molding Press

A new 1,100-ton capacity, 10-opening, hydraulic platen press for the production of molded cellular rubber products has been placed on the market by R. D. Wood Co., Philadelphia, Pa. The machine has a platen size of 42 by 42 by 2½ inches and overall dimensions of 14 by five by four feet. It is elevator fed and can be used with an accumulator system or a self-contained pumping unit. It can also be employed for general-purpose rubber processing operations such as curing slab stock and producing floor tile.



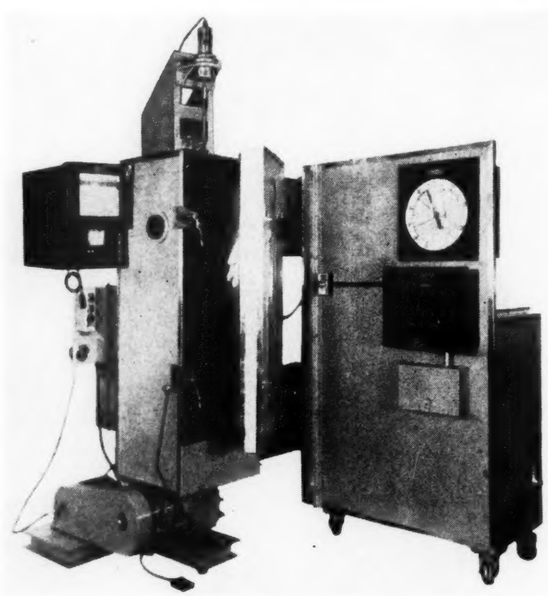
Wood's new 10-opening hydraulic platen press

Extreme Temperature Rubber Tester

A tester for the determination of modulus, tensile strength, per cent. elongation, and resistance to tear of elastomeric materials at temperatures ranging from minus 70 to 550° F. has been placed on the market by Scott Testers, Inc., Providence, R. I. Designated Model L-8, the tester is furnished in two units for convenience of operation and maximum versatility: the testing instrument and the conditioner.

The testing instrument consists of the standard Scott rubber

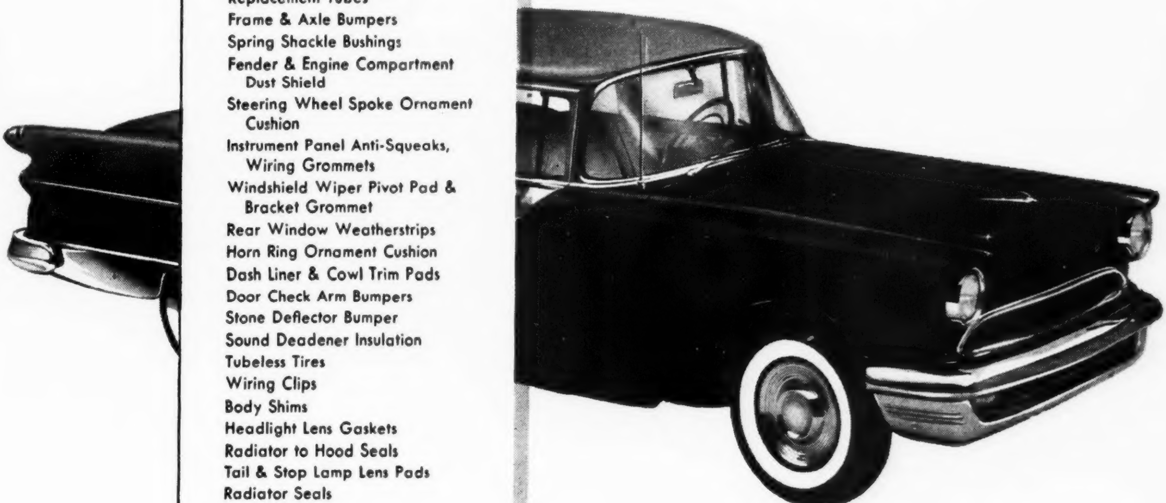
(*Continued on page 528*)



Scott Testers' Model L-8

Steering Collar Insulator
Radiator Hose
Heater Hose
Body Insulators
Heater Can Anti-Squeak Pad
Steering Post Bracket Insulator
Spark Plug Covers
Steering Post Pads
Radiator Drain Tube
Silent Block Bushing
Tail Pipe Insulator Support
Wiper Hose
Antenna Gaskets
Division Channel Weatherstrip
Window Channel Filler Seal
Parking Light Lens Gaskets
Bumper to Fender Spacer
Fresh Air Adapter Grommets
Battery Drain Tubes
Gearshift Lever Arm Bushing
Replacement Tubes
Frame & Axle Bumpers
Spring Shackle Bushings
Fender & Engine Compartment Dust Shield
Steering Wheel Spoke Ornament Cushion
Instrument Panel Anti-Squeaks, Wiring Grommets
Windshield Wiper Pivot Pad & Bracket Grommet
Rear Window Weatherstrips
Horn Ring Ornament Cushion
Dash Liner & Cowl Trim Pads
Door Check Arm Bumpers
Stone Deflector Bumper
Sound Deadener Insulation
Tubeless Tires
Wiring Clips
Body Shims
Headlight Lens Gaskets
Radiator to Hood Seals
Tail & Stop Lamp Lens Pads
Radiator Seals
Hood Lacing
Fender Seals
Hood Bumpers
Bumper Grommet
Glove Box Door Bumpers
Gas Tank Filler Neck Grommet
Sill Mats & Attaching Grommets
Defroster Hose
Door Bumpers

super-durable Enjay Butyl protects '55 cars in over 100 places



It's good news for car owners that the rubber parts that used to crack, chip, and practically disintegrate under tough road and weather conditions are being replaced with parts made from super-durable Enjay Butyl. In over 100 vital places, Enjay Butyl helps give many '55 models the performance and appearance that make them a pleasure to drive, an economical unit to maintain.

If you make a product in which rubber is used, or *could* be used, you owe it to efficient business practice to investigate the many advantages that Enjay Butyl has over other types of rubber. Its price is a definite advantage, too. Complete laboratory and technical facilities are at your service. For full information contact the Enjay Company today.

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NEW MATERIALS

Adhesive Plastisol—Arcco C 1035

A new plastisol which is said to provide strong adhesive bonds to black iron, steel, galvanized metals, and other metal surfaces without the need of primers has been placed on the market by American Resinous Chemicals Corp., Peabody, Mass. Called Arcco C 1035, the material is recommended for such uses as calking side seams of galvanized pipes and drainage pipes, and for drum linings and other metal coatings where resistance to acids and alkalies is needed. Arcco C 1035 is available as black or clear solutions in varying viscosities.

Glycol Ester Plasticizer—BD-8

A glycol ester plasticizer said to exhibit superior low-temperature behavior and resistance to extraction has been introduced by Rubber Corp. of America, Hicksville, N. Y. Called BD-8 (butanediol dicaprylate), it is compatible with a wide variety of natural and synthetic rubbers and resins at low temperatures, a condition which permits increased extrusion speeds and smoother surfaces, the company declares. The absence of ether linkages in the molecule, furthermore, results in improved aging characteristics.

Reported physical properties of BD-8 are shown:

Specific gravity, 20/20° C.	0.929 ± 0.003
Mid-boiling point, @ 5mm. Hg.	220° C.
Distillation range, @ 5mm. Hg.	5-95% between 211-222° C
Flash point	390° F.
Freezing point	10.5° C.
Viscosity	19 cps.
Surface tension, @ 25° C.	33 dynes/cm.
Weight/gallon, @ 20° C.	7.74 lbs.
Solubility in water, @ 25° C.	0.01%
Water solubility in BD-8, @ 25° C.	0.16%

Processing Aids—Poly-Sperse AP-300 and AP-400

Poly-Sperse AP-300 and AP-400, specially designed rubber processing aids which speed up the mixing cycle and maintain a high level of hardness and stiffness in the vulcanizate, have been announced by National Polychemicals, Inc., Wilmington, Mass. Stocks with high filler loadings are handled with comparative ease, and relatively small amounts of these new materials exhibit lower Mooney plasticity values than stocks in which light processing oils are used, according to the company. Dispersion of pigments or other compounding ingredients is facilitated by the use of Poly-Sperse, and these materials also have a mild activating effect on the cure.

The action of both AP-300 and AP-400 is essentially the same. AP-300, however, is a more efficient plasticizer and imparts higher hardness and stiffness to the cured stock. AP-400 is somewhat lower in cost. Both materials are pourable liquids, and the specific gravity of AP-300 is 1.05; while that of AP-400 is 1.03.

In highly loaded stocks up to 20 parts of AP-300 or AP-400 on the rubber hydrocarbon may be used effectively. With more than 20 parts, some downward adjustment in accelerator content may be desirable because of the activating effect of the Poly-Sperse.

A technical bulletin, PBB-2, containing suggested formulation and test results may be obtained from National Polychemicals, Inc.

Sponge Vinyl Plastisols

A new series of sponge vinyl plastisols has been put on the market by Watson-Standard Co., Pittsburgh, Pa. The plastisols contain chemical blowing agents and, when subjected to 300-400° F. heat for 3-30 minutes, will produce uniform vinyl sponge at expansions of 100-600% and with densities of 8-30 pounds per cubic foot. These plastisols may be spread coated, sprayed, molded, dipped, or cast.

The resultant sponge is said to be tough, flexible, non-shrinking, and resistant to oxidation, oils, greases, and most acids, alkalies, and solvents. Available in many colors, the plastisols may be used for the manufacture of a variety of products, including rollers, cushions, upholstery backing, insulation, and shock absorbers.

When used in combination with vinyl plastisol skins, Watson-Standard reports, the fabricator may produce in one operation many items which otherwise would have required fabrication from several integral parts.

Cement for Butyl Bonding—Ty-Ply BC

A cement designed for the vulcanized bonding of Butyl rubber to metals and Butyl to itself and to other elastomers has been introduced by Marbon Chemical, division of Borg-Warner Corp., Gary, Ind. Called Ty-Ply BC, the material is supplied as a black liquid, which has a drying time of 30 minutes and is said to possess excellent storage stability. Hot application of the cement for rapid drying is also feasible, Marbon says.

For bonding Butyl to metals, the cement must be used as a cover-cement over a primer, such as Ty-Ply UP. The cement is also said to be effective when used alone for the vulcanized bonding of cured and uncured Butyl compounds to each other and to other rubbers. Ty-Ply BC is, however, not recommended for bonding unvulcanized Butyl to vulcanized natural rubber, neoprene, or Buna-N.

Technical Report AD-6, describing the cement and reporting Butyl-to-steel adhesion data and six test stock formulae, is available from the company.

Mixed Sebacic Acid Plasticizer

A new base material claimed to show promise for the production of synthetic rubber and vinyl plasticizers has been introduced by U. S. Industrial Chemicals Co., division of National Distillers Products Corp. Designated U.S.I. Isosebacic acid, the compound consists of mixed isomers of sebacic acid in approximately the following proportions: α-ethyl suberic acid 72-80%; α-á-diethyl adipic acid, 12-18%; and sebacic acid, 6-10%.

The new material is said to offer a plasticizer with excellent low-volatility, non-migration, and low-temperature characteristics. Other than vinyls, possible applications include production of polyamides; alkyd resin manufacture; synthesis of ester lubricants for jet aircraft; polyester resin production; and the synthesis of polyurethanes and synthetic rubber.

Availability is presently limited to laboratory and pilot-plant quantities, obtainable from the U. S. I. market development department. Plans for a full-scale commercial plant are under way; capacity will depend upon the outcome of current market evaluations.

Tentative specifications are listed as follows:

Molecular weight	202.24
Combining weight	101.12
Minimum dicarboxylic acid content, %	98.5
Maximum volatile acid content, ppm.	300
Moisture content, %	0.3
Ash content, %	0.1
Iron content, ppm.	3
Iodine number	1
Color, A.P.H.A.	60
Melting range, °C.	68-74
Density, 80° C., lbs./gal.	8.55

General-Purpose Furnace Black—Arogen GPF

A new general-purpose oil furnace carbon back that is said to combine high tensile and high tear properties in the vulcanizate with excellent processing characteristics has been introduced by J. M. Huber Corp., New York, N. Y. Called Arogen GPF, the black has reinforcing properties superior to those of SRF grades and is applicable to both tire and mechanical goods manufacture, the company declares.

Physical properties of Arogen GPF are reported as follows:

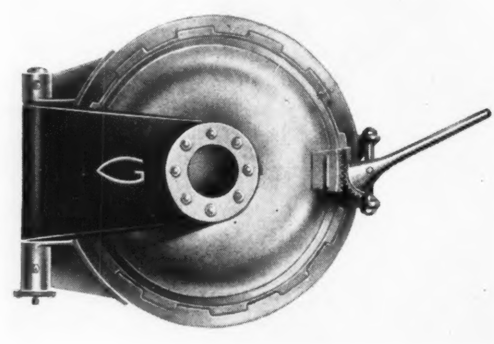
Apparent density, lbs./cu. ft.	26
Specific gravity in rubber	1.77
Particle diameter, millimicrons	60
Surface area, sq. meters/g.	45
pH, approximately	9.3
Ash, maximum, %	0.50
Oil absorption, cc./100 g.	84
Volatile matter, maximum, %	1.25
Moisture, maximum, %	1.0
Bleeding properties, tires	non-bleeding
Staining properties, enamel	non-staining

A technical report showing comparative test data of Arogen GPF and competitive products is available from the company at 100 Park Ave., New York 17.

Extreme-Temperature Rubber Tester

(*Continued from page 522*)

tester mounted on a special frame equipped with hot-cold test chamber. The device can be equipped for one rate of pull, for a finite number of specific rates of pull, or with completely variable rates of pull over a wide range of speeds. The temperature is controlled by a Brown recorder controller which may be manually set for a given temperature within the range and which maintains control of the temperature in the testing chamber within 1° of the operating range. Cooling is by dry ice.



Gussett Boiler & Welding, Inc., Vulcanizer Door

Quick-Opening Vulcanizer Door

A new quick-opening door for vulcanizers has been placed on the market by Gussett Boiler & Welding, Inc., Canton, O. Featured is a large-diameter boss on which the door rotates to engage the lugs for sealing. The boss, welded firmly to the convex face of the door, is said to provide many times the bearing area formerly possible with the small-diameter pins normally used, producing a more stable assembly, eliminating wobble and difficult closing, and insuring uniform sealing.

Also unique, according to the company, is the universal-type rack and pinion employed for engaging and rotating the door, especially valuable on heavy doors. Permanently attached, it is said to eliminate the use of heavy bars for rotating the door, and precludes the possibility of injury.

For fingertip release

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Moe Muscles used to claim that with Dow Corning mold lubricants he could meet the production quota standing on his head. After trying new *fine particle* Dow Corning 36 Emulsion, however, he's willing to go one better.

That's because Dow Corning 36 has an average particle size of less than 0.5 microns or about 1/10 that of previous silicone emulsions. That means it's more resistant to creaming or separation due to heat, cold, centrifuging or high dilution than any other silicone emulsion ever developed. Equally important, in many applications fine particle size also results in an improved, less oily surface finish.

Furthermore, new *fine particle* Dow Corning 36 Emulsion is available at the same low price as the regular Dow Corning mold release emulsions. That adds up to easier release, better appearance and fewer rejects . . . at production costs that are lower than you ever experienced before. For further information and a generous free trial sample, return the coupon TODAY!

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Given a chance, a Dow Corning silicone defoamer almost always gets its man . . . restores productive capacity previously wasted on foam . . . and at very low cost. For example:

- **12 ppm defoam Geon latex**
- **1 ppm defoam neoprene latex**
- **22 ppm defoam soapy latex dip**
- **20 ppm defoam butadiene styrene emulsion**

And you get increased production immediately without installing expensive new equipment. All you have to do in the case of most foamers is add a few parts per million of the water dilutable Antifoam AF Emulsion or, where solvents can be tolerated, a dispersion of Antifoam A. Both of these Dow Corning silicone defoamers are physiologically harmless. Both of them **increase production • reduce processing time • eliminate the waste and fire hazard of boil-overs.**

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NEW PRODUCTS

Firestone Nylon Airplane Tire

A nylon cord commercial airplane tire said to represent a 20% longevity increase over similar tires now in use has been introduced by The Firestone Tire & Rubber Co., Akron, O. Dubbed Sky Champion Gear Grip, the new tire was designed with wider ribs at the tire's points of maximum contact with runways and with an increased overall contact area.

Newly developed chemical substances, such as antiozidants, have been incorporated into the tire to protect it from fumes, oil, and ozone concentrations, Firestone says. The tires are available with ply ratings of 10 to 20, in sizes 34-9.9, 12:50-16, 15:50-20, and 44-inch. The 15:50-20 is also made with rayon cord.

Firestone Sports Car Tire

A high-speed sports car tire said to have improved traction, longer tread wear, and better lateral and forward stability also is being offered by Firestone. Designated Super Sports 170, the new tire is tubed, constructed of nylon cord, and has its individual tread units knitted together with tie bars to make the entire tread pattern operate as a unit.

The tire was used on the winning car of the recent Fifth Florida International 12-Hour Grand Prix of Endurance, proving its wearing, traction, and safety qualities, Firestone says. A tubeless design is expected to be introduced in the near future.

Golf Ball for Female Golfer

A golf ball designed especially for the woman golfer has been introduced by United States Rubber Co., New York, N. Y. Dubbed U. S. Royal Queen, it meets the required specifications of the United States Golf Association, being 1.68 inches in diameter, 1.62 ounces in weight, and having an initial velocity of 250 feet a second, but its winding is said to be specifically tailored to the woman's swing. This ball has a silicone center. Cover styles are in diamond or conventional dimple indentations.

Self-Adjusting V-Belt

A V-belt for home blower-heating systems and cooling fans that automatically adjusts itself to optimum operational tension has been developed by The Dayton Rubber Co., Dayton, O. Called Q.V.D. belt, it is said to incorporate a mechanical "watchman" that prevents tightness, thus eliminating vibration noises and minimizing motor and bearing wear. The principle of this self-adjustment device has not been divulged.

Available in a 17/32-inch wide, 9/32-inch thick size, with a 40-degree V-angle, the belt is composed of a special synthetic rubber and fabric.

Seiberling Premium Tubeless

A premium nylon-cord, white sidewall tubeless tire with leak-proof inner liner has been put on the market by Seiberling Rubber Co., Akron, O. Called T-190, the tire is said to have improved traction, reduced noise and vibration level, a wider-than-normal sidewall, and small cylindrical openings in the shoulder of the tire which help dissipate operating heat. The tire is available in a full range of sizes.

T-190 Tubeless Power Trac

Off-the-Road Truck Tire

An off-the-road truck tire designed for mining, logging, oil field and construction work, and similar activities calling for movement over difficult terrain also has been developed by Seiberling. Known as Power Trac, this tire is said to be composed of a newly developed rubber compound, and a 50% increase in tear resistance over similar tire types is claimed for it.

The tire features heavier tread lugs spaced farther apart in the shoulder area for added traction, and tread ridges that prevent stones from becoming wedged in between the lugs. The new product is not intended for use where long runs at high speed are involved.

Power Trac is available in both rayon and nylon cord constructions and in sizes 8.25-20 through 11.00-24.

Allyl-Resin Safety Prescription Lenses

Safety prescription lenses said to possess twice the strength of heat-treated glass and weighing 40-50% as much have been developed by United States Safety Service Co., Kansas City, Mo. Composed of an allyl-resin material dubbed Optilite, the lenses are also reported to be more resistant to chemicals and solvents than glass, have improved abrasion resistance, to be unaffected by extreme temperature changes, filter out ultra-violet rays, transmit light better, and reduce fogging owing to their thermal conductivity of 60-75% less than glass.

Only under extreme impact test conditions does the material shatter, the company says, then yielding larger and less sharp segments than would result from glass. Optilite is said to meet all the current requirements of accepted ophthalmic standards and federal specifications. Lenses are available in a wide corrective range, including bifocals, and in tints of white, rose, or green.

A descriptive booklet, "New Horizons in Eye Protection-Correction," may be obtained from the company on request.

NBS Lab Testing

(Continued from page 486)

minimum bursting pressure. Accurate as these determinations have proved, actual flight tests cannot be completely eliminated. Conditions such as changing temperatures, wind pressures, the presence of ozone, and even the action of cosmic rays are encountered by a balloon in flight, and these cannot be reproduced artificially with true accuracy. But the tests, NBS declares, are still extremely valuable in plant control and in the development of new balloon materials.

TECHNICAL BOOKS

BOOK REVIEWS

"Organic Syntheses." Collective Volume III. Edited by E. C. Horning. John Wiley & Sons, Inc., New York, N. Y. Cloth. 6 by 9 inches. 890 pages. Price, $15.

This third collective volume in the series encompasses all the material in Annual Volumes 20-29 and includes corrections, revisions, and seven new checked procedures. The format is generally the same as that of the individual volumes, with compounds to be prepared arranged alphabetically. A thumb index provides quick reference to the general index, illustrations, solvents and reagents, formula index, compound index, and reaction index.

"Lehrbuch der Organischen Chemie." Twelfth Revised Edition. Paul Karrer, Professor at the University of Zurich. Georg Thieme Verlag, Stuttgart. 1954. Cloth, 7½ x 10½ inches. 969 pages. Price, 59.70 DM. ($14.20).

Karrer's text in organic chemistry has become known as one of the great authorities in the field, reaching through translations in several languages a number of countries outside the German-speaking area. The fourth English edition, corresponding to the eleventh German edition, came out in 1950,[1] and now the twelfth German edition appears.

Like its predecessor, it is divided into four parts covering, respectively: aliphatic, carbocyclic and heterocyclic compounds, and organic compounds with isotope elements. Many of the sections have been substantially revised in the light of developments that have taken place up to the Spring of 1953, with natural products, important biological and physiological substances, synthetic dyes and intermediates receiving special attention. More space has been given to treatment of reaction mechanisms on the basis of the electronic theory, and Part IV, which in the eleventh edition covered only organic compounds with heavy hydrogen and heavy oxygen, now includes two new chapters on compounds with carbon and nitrogen isotopes, respectively.

Following the order established in former editions, the material is again systematically arranged on the basis of the nature and the number of functional groups. The fairly extensive enlargement of certain chapters made it necessary to reduce some sections, and for this reason, too, most of the tables have been left out. But there is an index covering 56 pages, and the list of important dates in the history of organic chemistry has been amplified and brought up to 1951-52.

[1] See our Aug., 1950, issue, p. 597.

NEW PUBLICATIONS

"Draw Benches and Auxiliary Equipment." Aetna-Standard Engineering Co., Pittsburgh, Pa. 8 pages. Photographs and descriptions of the company's cold drawing equipment, including dual chain, triple draw, single draw, five draw benches, piercing mill, bull block, cold reducing mill, squeeze pointers, air operated carriages, and air operated hook, are contained here.

"B. F. Goodrich Steam Hose." The B. F. Goodrich Co. Industrial Products Division, Akron, O. 2 pages. Cross-sections, sizes, and applications of the firm's steam hose appear in this pamphlet.

Publications of Columbia-Southern Chemical Corp., Pittsburgh, Pa.:

"Hi-Sil 233." Hi-Sil Bulletin No. 4. 1 page. Listed are the physical and chemical properties of Hi-Sil 233, a high-quality reinforcing silica for rubber compounding and other applications.

"Carbon Black-Silica Mixtures in Tire Treads." Hi-Sil Bulletin No. 5. 7 pages. Reprinted from the April, 1955, issue of RUBBER WORLD, this article by Ralph F. Wolf describes the effects of replacing some of the carbon black in natural rubber tire treads with silica pigments.

Publications of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

"Hard Neoprene Compounds with Excellent Processing Safety." Report BL-284. M. A. Schoenbeck and J. P. Munn. 7 pages. Recommended recipes for compounding hard Neoprene Types W or WRT with high loadings of soft carbon black and a combination of Thionex, DOTG, and sulfur accelerators are described here, together with applications and physical data of the resulting stocks.

"Neoprene Type KNR—A Processing Aid for High Durometer Neoprene Stocks." Report BL-285. D. C. Thompson and R. M. Murray. 2 pages. Data showing how the replacing of small amounts of general-purpose neoprene with Neoprene Type KNR improves the desired characteristics of high-durometer vulcanizates are reported.

"An Economical Neoprene Blend." Report BL-286. D. C. Thompson and S. G. Byam. 2 pages. Presented here are data revealing how the addition of Neoprene Type WHV to Neoprene Type GN-P reduces the latter's stickiness and excessively rapid curing.

"Mechanical Molded Goods—Neoprene and Hypalon." D. C. Thompson. 154 pages. Intended for the new technologist in the rubber industry, this book summarizes the techniques for the molding of mechanical goods from neoprene and Hypalon and includes information on molding methods, mold design, mold manufacture, presses, preparation of molding compound, molding operation, finishing, rubber-to-metal bonding, and common problems in procedure.

Publications of Office of Technical Services, United States Department of Commerce, Washington 25, D. C.:

"Development of a Rubber for Service in Contact with Experimental Hydraulic Fluids at 400° F." PB 111598. 15 pages. Price, 50¢. This report of work done at Wright Air Development Center in December, 1954, describes the development of a heat- and fluid-resistant rubber compound for long-service use at temperatures ranging from —65 to 400° F. in the hydraulic systems of supersonic aircraft. Optimum results were obtained with compounds of Neoprene WRT aged in a silicate ester-base hydraulic fluid. Comparative physical data tables show the advantages of these compounds.

"High Energy Radiation of Polymers. A Literature Review." PB 111529. 15 pages. Price, 50¢. The available literature on the effect of irradiation of polymers on physical properties such as oil and heat resistance and aging has been surveyed here, and the results of research in this field have been appraised and summarized. Particularly good results have been achieved with polyethylene, which after irradiation could withstand temperatures of 250° C. and above, and optimism prevails as to possible similar results with rubbers in general. Irradiation techniques for natural rubber, rubber vulcanizates, and other elastomers are outlined.

"Rubber Rolls." Rodney Hunt Machine Co., Orange, Mass. 60 pages. Price, $2.00 (free to users of rubber rolls). This study of rubber rolls discusses their manufacture, available types and functions of each, maintenance and treatment in industrial operation, regrinding, and other pertinent information and is illustrated with many photographs and physical data compilations.

"SR-4 Strain Gages, Instruments and Accessories." Baldwin-Lima-Hamilton Corp., Philadelphia, Pa. 11 pages. Prices, sketches, and descriptions of the firm's gages and accessories are contained in this latest catalog.

"Saf-Pla Installation Instructions." U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y. 4 pages. Instructions for applying the firm's Saf-Pla, a surface coating material composed of ground rubber, asphalt, and waxes that is designed to reduce injuries from falls, especially to children, are included in this publication.

"The Story of the Chemicals You Live By." Diamond Alkali Co., Cleveland, O. 24 pages. The firm's products, their applications, and the plants that produce them are described in this booklet.

"Propylene Glycol." F-8738. Carbide & Carbon Chemicals Co., New York, N. Y. 16 pages. The specifications, physical and physiological properties, constant-boiling mixture data, solubilities, and applications of propylene glycol, both a widely used solvent and a polyester resin raw material, are contained in this booklet.

"Emersol Oleic Acids." Emery Industries, Inc., Cincinnati, O. 20 pages. Specifications of the firm's oleic acids, the means of evaluating them, and the significance of their processing stability are covered in this illustrated booklet.

"Tubeless Automobile Tires—Mounting, Demounting, and Repairing." The Rubber Manufacturers Association, Inc., New York, N. Y. 8 pages. This profusely illustrated booklet describes the mounting and demounting of tubeless tires, emphasizing the proper preparation of rims.

"Galex." National Rosin Oil Products, Inc., New York, N. Y. 8 pages. The properties and applications of the firm's Galex, a stabilized non-oxidating rosin designed for such uses as rubber-based pressure-sensitive adhesives, extender for natural and synthetic resins, and other products where an oxidating rosin is impractical, are reported in this booklet.

"1954 Supplement to Book of ASTM Standards Including Tentatives—Part 6: Rubber, Plastics, Electrical Insulation." American Society for Testing Materials, Philadelphia, Pa. Paper cover, 532 pages. Price, $3.50. This supplement to the original 1952 edition and to the 1953 supplement includes 66 standards covering such rubber products as automotive and aeronautical rubber, packing and gasket material, hose, latex foam, and expanded cellular rubber; plastics specifications, physical properties, analytical methods, and definitions; and electrical insulating materials and electrical tests.

"Meadol—a Lignin from Hardwood." 14 pages. The Mead Corp., Chillicothe, O. The chemical and physical properties of the firm's Meadol and its industrial applications in such fields as rubber, ceramics, and petroleum drilling are described in this booklet.

"Riehle Testing Machines and Instruments." Bulletin RG-14-55, Riehle Testing Machines Division, American Machine & Metals, Inc., East Moline, Ill. 8 pages. Brief descriptions and photographs of the company's testing machines, including those for testing hardness, compression, torsion, and tensile strength, are included in this catalog, with references to more detailed bulletins on specific devices.

"The Upper Kanawha Valley." Upper Kanawha Valley Development Association, Montgomery, W. Va. 12 pages. The industrial potential and manpower availability of the Upper Kanawha Valley in West Virginia are the subjects of discussion of this booklet.

"1955 Year Book." The Tire & Rim Association, Inc., Akron, O. Price, $3.50. Included in this edition are the Association's latest approved tire and rim standards for passenger cars, trucks and buses, off-the-road vehicles, agricultural vehicles, industrial vehicles, and airplanes. Company membership in the organization is listed, as well as the men who compose the standards committee and its various subcommittees.

"**Consulting Services.**" 15th Edition, 1955. Association of Consulting Chemists & Chemical Engineers, Inc., New York, N. Y. 144 pages. Price, $1. Always a valuable handbook for those seeking consultant's advice or services, this edition is divided into three easily thumbed sections: an alphabetic list of fields with numerical references to specialized and qualified firms; detailed data on the firm's location, personnel, and activities; and an alphabetic index of the firms.

"**Air Permeability Apparatus.**" Bulletin 2262. American Instrument Co., Inc., Silver Spring, Md. 4 pages. Described here is the company's device for determining the air permeability of rubber and rubber-like materials. Other available elastomer testing equipment is also pictured.

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MARKET REVIEWS

Natural Rubber

Slow trading characterized both spot and future markets during the first half of the period from May 16 to June 15, but activity suddenly accelerated with the advent of June and continued strong till the end of the period. Strikes and riots in Singapore, and the UAW-Ford, UAW-General Motors settlements here both, ironically, served the same end, of stimulating demand for near and future covering and raising prices of all grades. Heavy European and Russian orders also contributed to the bullish trend.

U. S. automotive production remained at high levels, despite some shutdowns and slowdowns caused by wildcat strikes during the labor negotiations.

According to the International Rubber Study Group, United States consumption of natural rubber is expected to total 585,000 long tons for 1955, slightly below the 596,250 long tons recorded for 1954; but world consumption is expected to exceed the 1,767,500 long tons consumed in 1954, with 1,830,000 long tons anticipated for 1955.

Statistically, on the New York Commodity Exchange, sales for the second half of May were 8,900 tons, bringing the monthly total to 17,710 tons. Sales during the first half of June were 27,590 tons, reflecting the sudden burst of activity. Sales on June 13 alone reached the impressive figure of 469 lots, the heaviest trading in the post-Korean era.

Near July stocks began the period at 31.40¢ a pound, reached the period's high of 36.10¢ on June 13, and dropped to 35.10¢ on June 15.

COMMODITY EXCHANGE
WEEK-END CLOSING PRICES

Futures	Apr. 23	May 21	May 28	June 4	June 11
1955					
May	32.10	....	....	....	....
July	31.95	31.40	31.85	32.75	34.05
Sept.	31.45	31.25	31.60	32.15	33.85
Dec.	31.05	30.90	31.25	31.82	33.25
1956					
Mar.	30.60	30.50	30.90	31.40	32.55
May	30.30	30.20	30.60	31.10	32.05
July	....	29.90	30.30	30.80	31.75
Total weekly sales, tons	7,070	3,860	4,530	1,880	2,130

On the physical market, R.S.S. #1 began the period at 31.75¢ a pound, was 32.25¢ on June 1, 34.00¢ on June 7, and shot to the period's high of 36.13¢ on June 13, as the Singapore riots reached serious proportions. The spot price eased to 35.25¢ on June 15.

May monthly average spot prices for certain grades follow: R.S.S. #1, 31.80¢; R.S.S. #3, 31.06¢; #3 Amber Blankets, 28.86¢; and Flat Bark, 25.95¢.

NEW YORK SPOT MARKET
WEEK-END CLOSING PRICES

	Apr. 23	May 21	May 28	June 4	June 11
R.S.S.: #1	32.63	31.75	32.25	32.50	34.13
2	32.50	31.38	31.88	32.13	33.75
3	32.38	31.00	31.50	31.75	33.50
Latex Crepe					
#1 Thick	35.50	33.88	34.50	35.00	36.75
Thin	35.25	34.00	34.50	35.00	36.75
#3 Amber Blankets	29.63	28.88	29.50	29.88	31.38
Thin Brown Crepe	2913	28.63	29.25	29.63	31.13
Flat Bark	27.63	26.00	26.50	26.88	28.50

Synthetic Rubber

The United States will produce 886,000 long tons of synthetic rubber in 1955, according to estimates of the International Study Group, a considerable increase over the 622,500 long tons actually produced in 1954. Estimated consumption for 1955 is reported at 815,000 long tons. A total of 636,750 long tons was consumed in 1954. These figures include the oil content of oil-extended rubbers.

Consumption of synthetic rubber in April was 71,728 long tons, compared to the 77,118 long tons consumed in March, which was at an all-time high. However, an indication of the continuing trend toward the synthetic in this country, at the expense of the natural product, may be seen by comparing these figures with natural rubber consumption for the same two months. In March 58,472 long tons were consumed; in April, 52,954. The March ratio of natural to synthetic was 43.12%. The April ratio of natural to synthetic was 42.47%. This trend away from natural is expected to continue, especially with the technological improvements in the synthetic product which are most certainly forthcoming.

Not only is consumption of the synthetic likely to increase for the next five or ten years, but so will production. In fact, the Business & Defense Services Administration of the United States Department of Commerce recently pointed out that U. S. production of synthetic rubber must increase, not only to meet domestic requirements, but also the needs of the rest of the world.

The BDSA estimates that the American synthetic rubber industry has an annual capacity of 925,000 long tons. The production capacity of the rest of the world, excluding the Communist bloc, is put at 100,000 long tons a year. By 1959, the BDSA says, assuming natural rubber production will stay about what it is now, as it is expected to, an additional 215,000 long tons of synthetic rubber will have to come from somewhere to meet the anticipated 3,100,000 long tons of new rubber, natural and synthetic, which will be needed by the free world's consumers.

Grades of privately produced GR-S and GR-I types of synthetic rubbers and prices have been included in our "Compounding Ingredients" listing in this issue. In almost all cases the trade names are suffixed with the same code numbers as used by the government, that is, GR-S 1000 may now be designated as Butaprene S-1000 or just Plioflex 1000 or Philprene 1000.

Prices for GR-S types are quoted some with freight charges prepaid, some with freight charges collect, and some with part of the freight charges prepaid. Consumers will need to check prices and freight charges, however, before forwarding orders in view of the newness of the private GR-S type synthetic rubber industry.

Latex

Consumption of *Hevea* and synthetic latices during the period from May 16 to June 15 showed some signs of falling to lower levels, relieving the general anxiety concerning the one-month domestic supply that many quarters believe to be all that remains. Vacations were beginning to influence production quotas, as were some shutdowns and slowdowns caused by labor-management difficulties. Near imports were keeping time with consumption, but third-quarter orders were said to have been reduced, mostly because of uncertainty of prices, both for latex and for R.S.S. #1.

Prices of *Hevea* latex during May ranged between 40⅜¢ and 41½¢ per pound solids; while July deliveries were somewhat lower, between 39½¢ and 41¢. Prices of synthetic latices were as follows: GR-S, 21.5-28.00¢; neoprene, 37-47¢, and N-Type, 46-54¢.

Final March and preliminary April domestic statistics for natural and synthetic rubber latices follow:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
March	0	7,611	8,231	7,701
April	0	8,000	8,000	....
GR-S				
March	6,991	87	5,617	6,862
April	6,000	....	5,500	....
Neoprene				
March	854	0	889	867
April	750	0	800	....
Nitrile				
March	672	0	457	578
April	600	0	578	....

Reclaimed Rubber

The reclaimed rubber market continued good during the period from May 16 to June 15. Producers expected the high

levels to ease somewhat during July with the advent of vacations.

February exports, according to the Bureau of the Census, U. S. Department of Commerce, amounted to 2,430,791 pounds, valued at $222,891, as compared to the 2,331,597 pounds, worth $210,761, exported in January.

No change was reported in the domestic reclaim price structure.

RECLAIMED RUBBER PRICES

	Lb.
Whole tire: first line	$0.10
Fourth line	.0875
Inner tube: black	.15
Red	.21
Butyl	.15
Pure gum, light colored	.23
Mechanical, light colored	.135

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Scrap Rubber

Trading in scrap was fair during the period from May 16 to June 15, with major activity limited to suppliers filling mixed auto tire orders for June shipment to Naugatuck. June orders were said to be slightly above May's, and July levels were expected to be unchanged.

Statistics released by the Bureau of the Census, U. S. Department of Commerce, show February exports of scrap rubber to have amounted to 3,685,509 pounds, value $111,764, considerably higher than the January exports of 1,416,915 pounds, value $43,369. Largest overseas recipient in February was Spain, which imported 1,691,401 pounds; West Germany received 724,259 pounds in February.

Current dealers' buying prices for scrap rubber grades, in carload lots delivered to mills at the points indicated, follow:

	Eastern Points (Per Net Ton)	Akron, O. (Per Net Ton)
Mixed auto tires	$12.00	$13.00
S. A. G. auto tires	Nom.	13.00
Truck tires	Nom.	14.00
Peelings, No. 1	40.00/41.00	40.00/42.00
2	23.00	24.00
3	15.00	Nom.
Tire buffing	16.00	13.00/14.00
	(¢ per Lb.)	
Auto tubes, mixed	4.00	4.25
Black	5.00	5.00
Red	6.50	6.50
Butyl	6.25	6.25

Cotton Fabrics

Trading on the industrial fabric market was active during the period from May 16 to June 15, with demand for wide industrial goods especially strong both before and after the UAW-Ford, UAW-General Motors contract settlements. Auto manufacturers, plastic coaters, furniture producers, and other firms were placing heavy forward orders for delivery in late July, August, and September. Planning for new auto models was already well advanced.

Trade sources report that mills were currently well sold on wide drills, sateens, and broken twills for June and through July. Some mills were concerned about meeting delivery commitments in July because of vacation and maintenance closings. Closings of finishing plants, however, were expected to balance out the situation.

Period-end prices follow:

COTTON FABRICS

Drills		
59-inch 1.85 yd.	yd.	$0.38
2.25-yd.		.325
Ducks		
38-inch 1.78-yd. S.F.	yd.	nom.
2.00-yd. D.F.		nom.
51.5-inch, 1.35-yd. S.F.		nom.
Hose and belting		.67
Raincoat Fabrics		
Printcloth, 38½-inch, 64x60, 5.35-yd.	yd.	.14 / $0.1475
6.25 yd.		.12
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.22
Osnaburgs		
40-inch 2.11-yd.	yd.	.245
3.65-yd.		.155
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	yd.	.70
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-inch, 1.65-yd., 2-ply	yd.	.465
64-inch, 1.25-yd., 2-ply		.595
Sateens, 53-inch, 1.32-yd.		.55
58-inch, 1.21-yd.		.60

Rayon

Total calculated production of rayon and acetate yarn during May was 72,400,000 pounds, of which 37,500,000 pounds were regular-tenacity yarn and 34,900,000 were high-tenacity yarn. This represented a slight decrease over April output, except for high-tenacity yarn, which remained about the same.

Shipments fell somewhat to 71,600,000 pounds, of which 35,900,000 were regular-tenacity yarn, a decrease from April, and 35,700,000 pounds were high-tenacity yarn, the same figure as April's. Month-end stocks, essentially unchanged, follow: total yarn, 40,100,000 pounds; regular-tenacity yarn, 35,400,000 pounds; and high-tenacity yarn, 4,700,000 pounds.

Prices per pound of rayon tire yarns and fabrics were unchanged.

RAYON PRICES

Tire Yarns	
High Tenacity	
1100/ 480	$0.62
1100/ 490	.62
1150/ 490	.62
1165/ 480	.63
1230/ 490	.62
1650/ 720	.61
1650/ 980	.61
1875/ 980	.61
2200/ 960	.60
2200/ 980	.60
2200/1466	.67
4400/2934	.63
Super-High-Tenacity	
1650/ 720	$0.64
1900/ 720	.64
Tire Fabrics	
1100/490/2	.72
1650/980/2	.695 / $0.73
2200/980/2	.685

CALENDAR

July 22

Chicago Rubber Group. Annual Golf Outing. St. Andrews Golf & Country Club, West Chicago, Ill.

July 28

New York Rubber Group. Annual Golf Outing. Shackamaxon Country Club, Scotch Plains, N. J.

August 19

Philadelphia Rubber Group. Annual Outing. Manufacturers' Country Club, Oreland, Pa.

August 28-September 1

NAFM Supply, Equipment & Fabric Fair and Annual Convention. Conrad Hilton Hotel, Chicago, Ill.

September 11-16

American Chemical Society. National Meeting. Minneapolis, Minn.

September 22

Southern Ohio Rubber Group. Fall Technical Meeting. Engineers Club of Dayton, Dayton, O.

October 4

The Los Angeles Rubber Group, Inc. Statler Hotel, Los Angeles, Calif.

October 5-9

World Plastics Fair & Trade Exposition. National Guard Armory, Los Angeles, Calif.

October 7

New York Rubber Group. Henry Hudson Hotel, New York, N. Y.

Chicago Rubber Group.

Detroit Rubber & Plastics Group, Inc.

October 13

Northern California Rubber Group.

October 14

Boston Rubber Group. Somerset Hotel, Boston, Mass.

October 18

Elastomer & Plastics Group. Northeastern Section, A. C. S. Science Park, Boston, Mass.

October 19

Washington Rubber Group.

October 28

Philadelphia Rubber Group. Poor Richard's Club, Philadelphia, Pa.

COMPOUNDING INGREDIENTS*

Abrasives

Pumicestone, powdered	lb.	$0.025	$0.045
Rottenstone, domestic	lb.	.03	.04
Shelblast	ton	80.00	165.00
Walnut Shell Grits	ton	50.00	160.00

Accelerators

A-1 (Thiocarbanilide)	lb.	.50	.57
A-32	lb.	.66	.80
A-100	lb.	.52	.66
Accelerator 49	lb.	.55	.56
108	lb.	.89	
552	lb.	2.25	
808	lb.	.66	.68
833	lb.	1.17	1.19
Altax	lb.	.50	.52
Arazate	lb.	2.25	
Beutene	lb.	.66	.71
Bismate	lb.	3.00	
B-J-F	lb.	.27	.32
Butasan	lb.	1.04	
Butazate	lb.	1.04	
Butyl Accelerator 21	lb.	.89	
Eight	lb.	1.10	1.35
Zimate	lb.	1.04	
Captax	lb.	.40	.42
C-P-B	lb.	1.95	
Cumate	lb	1.45	
Diesterex N	lb.	.50	.57
DOTG (diorthotolylguanidine)			
Cyanamid	lb.	.60	.61
Du Pont	lb.	.57	.58
DPG (diphenylguanidine)			
Cyanamid	lb.	.50	.51
Monsanto	lb.	.48	.55
El-Sixty	lb.	.58	.65
Ethasan	lb.	1.04	
Ethazate	lb.	1.04	
50-D	lb.	.85	
Ethyl Thiurad	lb.	1.04	
Tuads	lb.	1.04	
Tuex	lb.	1.04	
Zimate	lb.	1.04	
Ethylac	lb.	.93	.95
Hepteen	lb.	.44	.50
Base	lb.	1.85	
Ledate	lb.	1.04	
MBT (2-mercaptobenzothiazole)			
American Cyanamid	lb.	.40	.42
Du Pont	lb.	.38	.40
Naugatuck	lb.	.38	.43
-XXX, Cyanamid	lb.	.51	.53
MBTS (mercaptobenzothiazyl disulfide)			
Cyanamid	lb.	.50	.52
Du Pont	lb.	.48	.50
Naugatuck	lb.	.48	.53
-W Cyanamid	lb.	.53	.55
Mertax	lb.	.49	.56
Methasan	lb.	1.04	
Methazate	lb.	1.04	
Methyl Tuads	lb.	1.14	
Zimate	lb.	1.04	
Monex	lb.	1.14	
Mono-Thiurad	lb.	1.14	
Morfex	lb.	.65	.70
MT	lb.	1.00	
NOBS No. 1	lb.	.72	.74
Special	lb.	.77	.79
O-X-A-F	lb.	.49	.54
Pentex	lb.	1.04	
Flour	lb.	.21	
Permalux	lb.	2.17	
Phenex	lb.	.52	.59
Pip-Pip	lb.	2.07	
R-2 Crystals	lb.	4.35	
Rotax	lb.	.51	.53
RZ-50, -50B	lb.	1.00	
S. A. 52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	2.50	
Santocure	lb.	.69	.76
NS	lb.	.75	.82
Selenacs	lb.	2.60	
SPDX-GH	lb.	.69	.74
GL	lb.	1.20	1.34
Tellurac	lb.	1.21	
Tepidone	lb.	.45	
Tetrone A	lb.	1.91	
Thiofide	lb.	.48	.55
S	lb.	.50	.57
Thionex	lb.	1.14	
Thiotax	lb.	.38	.45
Thiurad	lb.	1.14	
Thiuram E	lb.	1.04	
M	lb.	1.14	
Trimene	lb.	.56	.62
Base	lb.	1.03	1.10
Tuex	lb.	1.14	
Ultex	lb.	1.00	1.10
Unads	lb.	1.14	
Ureka Base	lb.	.66	.73
Vulcacure NB	lb.	.45	
ZB, ZE, ZM	lb.	.85	
Z-B-X	lb.	2.45	
Zenite	lb.	.48	.50
A	lb.	.49	.51
Special	lb.	.49	.51
Zetax	lb.	$0.51	$0.53
Zimate	lb.	1.04	

Accelerator-Activators, Inorganic

Lime, hydrated	ton	20.21	
Litharge, comml.	lb.	.165	.17
Eagle, sublimed	lb.	.171	
National Lead, sublimed	lb.	.17	.18
Red lead, comml.	lb.	.175	.1925
Eagle	lb.	.18	
National Lead	lb.	.18	.1925
White lead, carbonate	lb.	.165	.175
Eagle	lb.	.165	.175
National Lead	lb.	.175	.185
White lead, silicate	lb.	.16	.1925
Eagle	lb.	.175	.1925
National Lead	lb.	.16	.18
Zinc oxide, comml.†	lb.	.135	.1775

Accelerator-Activators, Organic

Aktone	lb.	.22	.23
Barak	lb.	.62	
Capital 170	lb.	.2275	.2675
171	lb.	.1325	.1725
700, 701	lb.	.155	.195
705, 710	lb.	.155	.195
800	lb.	.12	.14
801	lb.	.1375	.1575
802	lb.	.1425	.1625
803	lb.	.165	.185
Curade	lb.	.57	.59
D-B-A	lb.	1.95	
Emery 600	lb.	.1325	.1725
Groco 30	lb.	.1325	.1725
35	lb.	.1375	.1775
Guantal	lb.	.57	.64
Hyfac 400	lb.	.1138	.1400
430	lb.	.1513	.1775
431	lb.	.1738	.20
Hystrene S-97	lb.	.1863	.2125
T-45	lb.	.1588	.185
T-70	lb.	.1688	.195
Industrene B	lb.	.1213	.1475
R	lb.	.1138	.14
158	lb.	.1263	.1525
254	lb.	.1363	.1625
262	lb.	.1463	.1725
Laurex	lb.	.33	.37
MODX	lb.	.295	.345
NA-22	lb.	1.50	
Oleic acid, comml.	lb.	.155	.195
Emersol 210 Elaine	lb.	.155	.195
Groco 2, 4, 8, 18	lb.	.155	.195
Plastone	lb.	.27	.30
Polyac	lb.	1.65	
Ridacto	lb.	.25	.26
Seedine	lb.	.1485	.1703
Stearex Beads	lb.	.1488	.1588
Stearic acid			
Emersol 120	lb.	.1363	.1625
130	lb.	.1588	.185
Hydrofol 51	lb.	.09	
Hydrogenated, rubber grade			
Groco	lb.	.12	.14
Rufat 75	lb.	.1138	.14
Single pressed, comml.	lb.	.1375	.1575
Emersol 110	lb.	.1313	.1575
Groco 53	lb.	.1375	.1575
Wilmar 253	lb.	.1313	.1575
Double pressed, comml.	lb.	.1425	.1625
Groco 54	lb.	.1425	.1625
Wilmar 254	lb.	.1363	.1625
Triple pressed, comml.	lb.	.165	.185
Groco 55	lb.	.165	.185
Wilmar 255	lb.	.1588	.185
Sterene 60-R	lb.	.09	.1075
Tonox	lb.	.515	.605
Vulklor	lb.	.75	.95
Wilmar 110	lb.	.155	.195
434	lb.	.1325	.1725
Zinc stearate, comml.	lb.	.37	.42

Antioxidants

AgeBest A26	lb.	.18	.24
620-32B	lb.	.20	.26
716-30	lb.	.18	.24
1041-21	lb.	.165	.225
1293-22A	lb.	1.90	2.00
AgeRite Alba	lb.	2.35	2.45
Gel	lb.	.64	.66
H. P.	lb.	.72	.74
Hipar	lb.	.98	1.00
Powder	lb.	.52	.54
Resin	lb.	.75	.77
D	lb.	.52	.54
Spar	lb.	.52	.54
Stalite	lb.	.52	.54
S	lb.	.52	.54
White	lb.	1.45	1.55
Akroflex C	lb.	.77	.79
CD	lb.	.72	.74
Albasan	lb.	.69	.73
Allied AA-1144	lb.	.23	.24
AA-1177	lb.	.155	.165
Aminox	lb.	.52	.57
Antioxidant 425	lb.	2.50	
2246	lb.	1.50	1.53
Antisol	lb.	.23	.24
Antisun	lb.	.15	.175
Antox	lb.	.52	.54
Aranox	lb.	3.25	
Betanox Special	lb.	.80	.85
B-L-E, -25	lb.	$0.52	$0.57
Burgess Antisun Wax	lb.	.185	
B-X-A	lb.	.52	.57
Copper Inhibiter X-872-L	lb.	2.01	
D-B-P-C	lb.	.91	1.16
Flectol H	lb.	.52	.59
Flexamine	lb.	.72	.77
Heliozone	lb.	.26	.27
Ionol	lb.	.91	1.40
NBC	lb.	1.55	
Neozone A	lb.	.56	.58
D	lb.	.52	.54
Octamine	lb.	.52	.57
PDA-10	lb.	.46	.48
Perflectol	lb.	.61	.68
Polygard	lb.	.52	.57
Protector	lb.	.26	.31
Rio Resin	lb.	.60	.62
Santoflex 35	lb.	.72	.79
75	lb.	.92	.99
AW	lb.	.78	.85
B	lb.	.52	.59
BX	lb.	.63	.70
DD	lb.	.52	.59
Santovar A	lb.	1.50	1.57
Santowhite Crystals, Powder	lb.	1.60	1.67
L	lb.	.52	.59
MK	lb.	1.29	1.36
Sharples Wax	lb.	.23	.28
Stabilite	lb.	.55	.59
Alba	lb.	.72	.79
L	lb.	.60	.64
White	lb.	.52	.60
Powder	lb.	.41	.47
Styphen I	lb.	.51	.55
Sunolite #100	lb.	.21	.23
#127	lb.	.17	.19
Sunproof -713	lb.	.25	.30
Improved	lb.	.25	.30
Jr.	lb.	.20	.25
Thermoflex A	lb.	.98	1.00
Tonox	lb.	.52	.57
Tysonite	lb.	.24	.2475
Velvapex 51-250	lb.	.40	
V-G-B	lb.	.70	.75
Wing-Stay S	lb.	.52	.61
Zenite	lb.	.48	.50

Antiseptics

Copper naphthenate, 6-8%	lb.	.24	
Pentachlorophenol	lb.	.21	.29
Resorcinol, technical	lb.	.775	.785
Zinc naphthenate, 8-10%	lb.	.245	.30

Blowing Agents

Ammonium bicarbonate	lb.	.065	.085
Carbonate	lb.	.16	
Blowing Agent CP- 975	lb.	.35	
Celogen	lb.	1.95	
50-C	lb.	1.01	1.07
Sodium bicarbonate	100 lbs.	2.70	3.30
Carbonate, tech.	100 lbs.	1.35	5.52
Sponge Paste	lb.	.20	
Unicel	lb.	.90	
ND	lb.	.76	
S	lb.	.20	

Bonding Agents

Braze	gal.	6.00	9.00
Cover cement	gal.	2.50	4.00
Flocking Adhesive RFA17, RFA22, RFA25	lb.	.50	
G-E Silicone Paste SS-15	lb.	4.52	5.10
SS-64	lb.	3.65	6.75
-67 Primer	lb.	7.50	12.50
Gen-Tac Latex	lb.	.75	.855
Kalabond Adhesive	gal.	6.50	16.00
Tie Cement	gal.	2.00	5.60
MDI	lb.	4.00	6.00
-50	lb.	2.00	3.00
Thixons	gal.	1.48	12.00
Ty Ply BN, Q, S, UP, 3640	gal.	6.75	8.00
RC	gal.	3.75	5.00

Brake Lining Saturants

BRT 3	lb.	.018	.0265
Resinex L-S	lb.	.0225	.03

Carbon Blacks‡

Conductive Channel—CC

Continental R-40	lb.	.23	.30
Kosmos/Dixie BB	lb.	.23	.30
Spheron C	lb.	.14	.185
Voltex	lb.	.18	.315

Easy Processing Channel—EPC

Continental AA	lb.	.074	.1225
Kosmobile 77/Dixiedensed 77	lb.	.074	.1225
Micronex W-6	lb.	.074	.1225
Spheron #9	lb.	.074	.1225
Texas E	lb.	.074	.1225
Witco #12	lb.	.074	.1225
Wyex	lb.	.074	.12

Hard Processing Channel—HPC

Continental F	lb.	.074	.1225
HX	lb.	.074	.12

* Prices, in general, are f.o.b. works. Range indicates grade or quantity variations. No guarantee of these prices is made. Spot prices should be obtained from individual suppliers.

† For trade names, see Color—White, Zinc Oxides.

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

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Light face type $1.25 per line (ten words)	Light face type 40c per line (ten words)	Light face type $1.00 per line (ten words)
Bold face type $1.60 per line (eight words)	Bold face type 55c per line (eight words)	Bold face type $1.40 per line (eight words)
Allow nine words for keyed address.		*Letter replies forwarded without charge, but no packages or samples.*

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SITUATIONS WANTED

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SALES **COMMERCIAL CHEMICAL DEVELOPMENT**
MARKET RESEARCH **PRODUCT RESEARCH**

15 years of experience in the rubber and plastics industries will prove of value to you.

Address Box No. 1748, care of RUBBER WORLD.

RUBBER CHEMIST. B. A. DEGREE. BILINGUAL. PROGRESsive individual with 13 years' experience in wire and cable industry, thoroughly familiar wth development and factory process supervision. Interested primarily in securing position in progressive company wherein experience and cultural background would be an asset. Would consider relocating in Spanish-speaking country. Address Box No. 1740, care of RUBBER WORLD.

RUBBER CHEMIST — SEEKS NEW POSITION WEST OF Mississippi. 31 years old, married, 6 years' college, 4 years experience in rubber research compounding in mechanical goods, O-rings, seals, etc. Now employed, but would like position with broader horizon. Address Box No. 1741, care of RUBBER WORLD.

RUBBER-VINYL-PLASTIC CHEMIST—5 YEARS' EXPERIENCE in compounding solvent and latex systems, plastisols and organosols, polyesters-calendering and coating procedures. Seeks position with progressive and reputable firm. N.Y.-N.J.-Conn. area. Address Box No. 1745, care of RUBBER WORLD.

LATEX CHEMIST, 10 YEARS' BROAD EXPERIENCE IN emulsions and solvent adhesives for shoe, handbag, leather, fabric, plastics, foil, sponge foam, paper products, etc. Qualified in production, development, research. Knows combining, laminating, shoe counter dip, castings, and coatings. Desires top-level position or sales. Will relocate if necessary. Address Box No. 1746, care of RUBBER WORLD.

CHEMICAL ENGINEER — RUBBER AND PLASTIC TECHnologist with broad experience in natural and synthetic latices, high polymers, dispersions, and plastisols involving laboratory, pilot plant, process development and plant evaluation of current and new products and technical sales. Good educational background in high polymers. Desires position with progressive organization. Address Box No. 1749, care of RUBBER WORLD.

SITUATIONS OPEN

RUBBER AND PLASTICS

Rubber Chemist, sponge experience desirable, plant or laboratory. Rubber Chemist, general compounding and plant experience desirable. Plastics Chemists or Engineers, laboratory and plant experience desirable. Quality Control Supervisor, capable of installing new department. Expanding Operation. Opportunities for Advancement. Salaries open. Details on request. Write: Dale A. Dougherty, Assistant to the President, O'SULLIVAN RUBBER CORPORATION, Box 603, Winchester, Virginia.

CHIEF LATEX CHEMIST TO DIRECT SOUTHERN MANUfacturing division of latex compounds for textile industry. Must be tops on compound experience and development. Ecellent opportunity in established growing concern. State fully qualifications and requirements. Address Box No. 1742, care of RUBBER WORLD.

CHEMICAL ENGINEER—OPENINGS WITH A FUTURE AVAILable for young men in a new laboratory and plant. Five years' or more experience in compounding all types of rubber and synthetic rubber for spread and calendered-coated fabrics. State all particulars in résumé, with a picture if possible. Address Box No. 1743, care of RUBBER WORLD.

ADHESIVE CHEMIST

Experienced in formulation and production of latex and solvent-rubber cements, particularly mastic-type cements used in the building trades. Excellent opportunity with rapidly-growing small company. Must be willing to relocate. Salary commensurate with experience. Give full details in first letter. Our employes know of this advertisement.

ADDRESS BOX NO. 1747, c/o RUBBER WORLD

SITUATIONS OPEN (Continued)

CHEMICAL OPENINGS

Outstanding manufacturer in the field of adhesives and coatings has three openings available on its staff. Each opening is a challenge to your creative and development capacities. Many company benefits and good future for yourself with a progressive manufacturer. If you qualify for any one of these positions address your reply, in confidence to the Personnel Director. Box No. 1739, care of RUBBER WORLD. Salary commensurate with background and experience.

1. CHEMIST—Either a graduate chemist or chemical engineer for adhesive and coating laboratory development. Must have experience with synthetic elastomers and resins.

2. CHIEF CHEMIST—For research and development laboratory specializing in synthetic elastomers and resin adhesives; nitrocellulose and modified cellulose adhesives and coatings. In addition to technical qualifications, applicant must have good administrative ability and experience in product control and plant production.

3. CHEMICAL FIELD TECHNICIAN—With good technical background in all types of adhesive and coating work. Must have experience as chemical sales engineer or as technical development man working with customers. Position involves field work connected with new product market research and field development on new products.

TECHNICIAN THOROUGHLY FAMILIAR WITH PROCESS of tire production required for special assignment for Far East for period of 4-6 months. Must be capable to set up and supervise start of machinery producing rubber tires. Good salary; all facilities for suitable man. Write giving full details of experience. Replies held confidential. Address Box No. 1744, care of RUBBER WORLD.

LATEX FOAM CHEMIST. ESTABLISHED EASTERN MANUFACturer seeks man with extensive experience in compounding and controlling latex foam. Excellent opportunity for exceptional man. Relocation required. All replies confidential. Our organization knows of this advertisement. Submit résumé to Box No. 1753, care of RUBBER WORLD.

MACHINERY AND SUPPLIES FOR SALE

FOR SALE: 30" MILL WITH MOTOR, GOOD CONDITION, also 24" x 54" Press with two 11-inch diameter rams, new pumping unit. Address Box No. 1751, care of RUBBER WORLD.

Kosmobile S/Dixiedensed			
S	lb.	$0.074 /	$0.1225
Micronex Mk. II	lb.	.074 /	.1225
Spheron #4	lb.	.074 /	.1225
Witco #6	lb.	.074 /	.1225

Medium Processing Channel—MPC

Arrow TX	lb.	.074 /	.12
Continental A	lb.	.074 /	.1225
Kosmobile S-66/Dixiedensed			
S-66	lb.	.074 /	.1225
Micronex Standard	lb.	.074 /	.1225
Spheron #6	lb.	.074 /	.1225
Texas 109	lb.	.079 /	.1275
M	lb.	.074 /	.1225
Witco #1	lb.	.074 /	.1225

Conductive Furnace—CF

Aromex 115	lb.	.089 /	.129
Vulcan C	lb.	.105 /	.15
SC	lb.	.18 /	.223

Fast Extruding Furnace—FEF

Arovel	lb.	.06 /	.10
Continex FEF	lb.	.06 /	.10
Kosmos 50/Dixie 50	lb.	.06 /	.10
Statex M	lb.	.06 /	.10
Sterling SO	lb.	.06 /	.10

Fine Furnace—FF

Statex B	lb.	.065 /	.105
Sterling 99	lb.	.065 /	.105

High Abrasion Furnace—HAF

Aromex	lb.	.079 /	.119
Continex HAF	lb.	.079 /	.125
Kosmos 60/Dixie 60	lb.	.079 /	.1175
Philblack O	lb.	.079 /	.119
Statex R	lb.	.079 /	.125
Vulcan #3	lb.	.079 /	.125

Intermediate Super Abrasion Furnace—ISAF

Aromex 125	lb.	.10 /	.14
Kosmos 70/Dixie 70	lb.	.10 /	.145
Philblack I	lb.	.10 /	.145
Statex 125	lb.	.10 /	.145
Vulcan 6	lb.	.10 /	.145

Medium Abrasion Furnace—MAF

Philblack A	lb.	.06 /	.10

Super Abrasion Furnace—SAF

Philblack E	lb.	.125 /	.165
Vulcan 9	lb.	.125 /	.168

General-Purpose Furnace—GPF

Arogen GPF	lb.	.05 /	.09
Sterling V	lb.	.05 /	.09
V Non-staining	lb.	.05 /	.09

High Modulus Furnace—HMF

Continex HMF	lb.	.055 /	.095
Kosmos 40/Dixie 40	lb.	.055 /	.095
Modulex	lb.	.055 /	.095
Statex 93	lb.	.055 /	.095
930	lb.	.047 /	.087
Sterling L, LL	lb.	.055 /	.095

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.045 /	.085
Essex	lb.	.045 /	.085
Furnex	lb.	.045 /	.085
Gastex	lb.	.05 /	.09
Kosmos 20/Dixie 20	lb.	.045 /	.085
Pelletex, NS	lb.	.045 /	.085
Sterling NS, S	lb.	.045 /	.085
R	lb.	.05 /	.09

Fine Thermal—FT

P-33	lb.	.055	
Sterling FT	lb.	.055	

Medium Thermal—MT

Sterling MT	lb.	.04	
Non-staining	lb.	.05	
Thermax	lb.	.04	
Stainless	lb.	.05	

Colors

Black

Iron oxides, comml	lb.	.1275/	.13
BK—Lansco	lb.	.1275/	.13
Williams	lb.	.1325/	.135
Lansco synthetic	lb.	.10	
Mapico	lb.	.1275/	.13
Lampblack, comml	lb.	.16 /	.45
Superjet	lb.	.0825/	.1175
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	.45 /	1.20
Vansul masterbatch	lb.	.60 /	.65
Paste	lb.	.14 /	.15

Blue

Du Pont	lb.	1.77 /	4.55
Filo	lb.	.28	
Heveatex pastes	lb.	.80 /	1.45
Lansco ultramarines	lb.	.25 /	.28
Monsanto Blue 7	lb.	1.55	
11	lb.	3.45	
DPB-283	lb.	1.93	
S-11	lb.	2.05	
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	1.55 /	1.60
Vansul masterbatch	lb.	.90 /	2.70

Brown

Filo	lb.	$0.13	
Iron oxides, comml	lb.	.1375/	.14
Lansco synthetic	lb.	.125	
Mapico Brown	lb.	.1375/	.14
Brown 422	lb.	.14	
Sienna, burnt, comml	lb.	.0425/	.155
Williams	lb.	.11 /	.1725
Raw, comml	lb.	.045 /	.1325
Williams	lb.	.08 /	.1725
Umber, burnt, comml	lb.	.06 /	.07
Williams	lb.	.0675/	.08
Raw, comml	lb.	.0625/	.07
Williams	lb.	.07 /	.0825
Williams			
Pure brown	lb.	.1425/	.145
Vandyke	lb.	.12	
Mapico Tan 20	lb.	.2025/	.205
Tan 15	lb.	.205	
Metallic brown	lb.	.045 /	.055
Vansul masterbatch	lb.	2.10 /	2.20

Green

Chrome	lb.	.19 /	.50
Chrome oxide	lb.	.3925/	1.10
G-4099, -6099	lb.	.3925/	.3975
GH-9869	lb.	1.00 /	1.15
9976	lb.	1.10 /	1.25
Green	lb.	.80 /	2.40
Du Pont	lb.	1.97 /	2.80
Filo	lb.	.40	
Heveatex pastes	lb.	.95 /	1.85
Lansco Toner	lb.	1.35	
Monsanto Green 3	lb.	2.75	
14	lb.	1.45	
17	lb.	3.95	
71205	lb.	1.35	
DGP	lb.	2.03	
S-17	lb.	2.25	
Stan-Tone	lb.	1.75 /	4.60
Vansul masterbatch	lb.	2.00 /	2.60

Orange

Du Pont	lb.	2.75	
Monsanto Orange 68187	lb.	2.90	
Stan-Tone	lb.	.70 /	3.35
Vansul masterbatch	lb.	2.00 /	2.60

Red

Antimony trisulfide	lb.	.285 /	.315
R. M. P. No. 3	lb.	.72	
Sulfur Free	lb.	.78	
Cadmium red lithopone	lb.	1.64 /	2.05
Cadmolith	lb.	1.72 /	2.20
Cyanamid	lb.	.85	
Du Pont	lb.	1.47 /	1.80
Filo	lb.	.11	
Indian Red	lb.	.1275	
Iron oxide, comml	lb.	.06 /	.13
Lansco synthetic	lb.	.1175	
Mapico	lb.	.1275/	.13
Recco	lb.	.12	
Williams Red	lb.	.1275/	.15
Monsanto Red 7	lb.	1.55	
41	lb.	4.40	
3501	lb.	1.15	
4004	lb.	1.50	
69191	lb.	3.38	
Autumn	lb.	1.10	
PRP-285	lb.	1.27	
S-44	lb.	1.28	
Maroon 113	lb.	1.50	
61148	lb.	1.75	
Rub-Er-Red	lb.	.0975	
Stan-Tone	lb.	.85 /	4.05
Tuscan	lb.	.15 /	.46
Vansul masterbatch	lb.	.95 /	3.30
Venetian	lb.	.035 /	.0625

White

Antimony oxide	lb.	.27 /	.305
Burgess Iceberg	ton	50.00 /	80.00
Cryptone BT	lb.	.10 /	.11
Permolith	lb.	.075 /	.085
Titanium pigments			
Rayox LW	lb.	.195 /	.205
R-110	lb.	.215 /	.225
Ti-Cal	lb.	.075 /	.0825
Ti-Pure	lb.	.195 /	.225
Titanox A, AA, A-168	lb.	.21 /	.22
C-50	lb.	.1225/	.1275
RA, -10, -50	lb.	.23 /	.24
RC	lb.	.0825/	.0875
-HT, -HTX	lb.	.08 /	.085
Unitane	lb.	.225 /	.255
Zopaque Anatase	lb.	.225 /	.235
Rutile	lb.	.245 /	.255
Zinc oxide, comml	lb.	.135 /	.1775
Azo ZZZ-11, -44, -55	lb.	.14 /	.16
20% leaded	lb.	.1435 /	.1635
35% leaded	lb.	.14625/	.16625
50% leaded	lb.	.14875/	.16875
Eagle AAA, lead free	lb.	.14 /	.15
5% leaded	lb.	.14 /	.15
35% leaded	lb.	.14625/	.15625
50% leaded	lb.	.14875/	.15875
Florence Green Seal	lb.	.1575/	.1675
Red Seal	lb.	.1525/	.1625
White Seal	lb.	.1625/	.1725
Horsehead XX-4, -78	lb.	.135 /	.145
Kadox-15, -17, -72, -515	lb.	.14 /	.15
-25	lb.	.1625/	.1725
Lehigh, 35% leaded	lb.	.14625/	.15625
50% leaded	lb.	.14875/	.15875
Protox-166, -167	lb.	.14 /	.15
St. Joe, lead free	lb.	.118 /	.16
Zinc sulfide, comml	lb.	$0.253 /	$0.263
Cryptone ZS	lb.	.253 /	.263

Yellow

Cadmium yellow lithopone	lb.	1.15	
Cadmolith	lb.	1.12 /	1.20
Du Pont	lb.	1.80 /	2.15
Filo	lb.	.10	
Iron oxide, comml	lb.	.0525/	.1075
Lansco synthetic	lb.	.1075	
Mapico	lb.	.105 /	.1075
Williams	lb.	.11 /	.1175
Monsanto Yellow 14	lb.	1.91	
10010	lb.	1.91	
BYP-282	lb.	1.21	
GA	lb.	2.45	
S-10010	lb.	1.17	
Stan-Tone	lb.	1.00 /	1.55
Vansul masterbatch	lb.	.95 /	1.95
Williams Ocher	lb.	.0525/	.055

Dusting Agents

Diatomaceous silica	ton	32.00 /	48.00
Extrud-o-Lube, conc	gal.	1.54 /	1.69
Glycerized Liquid Lubricant, concentrated	gal.	1.48 /	1.63
Latex-Lube GR	lb.	.20	
Pigmented	lb.	.1825	
R-66	lb.	.165	
Liqui-Lube	lb.	.1625	
N. T.	lb.	.1675	
Liquizinc No. 305	lb.	.30 /	.35
Lubrex	lb.	.25 /	.30
Mica Concord	lb.	.075 /	.0825
Mineralite	ton	45.00	
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Talc, comml	ton	18.40 /	38.50
EM	ton	11.00 /	63.00
LS Silver	ton	29.25	
Nytals	ton	25.00 /	36.00
Sierra Sagger 7	ton	34.00	
White IR	ton	19.75	
III	ton	20.75	
Vanfre	gal.	2.00 /	2.50

Extenders

BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
Cumar Resins	lb.	.065 /	.17
Dielex B	lb.	.06	
Factice, Amberex	lb.	.29 /	.36
Brown	lb.	.1425/	.268
Neophax	lb.	.157 /	.268
White	lb.	.144 /	.285
G.B. Asphaltenes	lb.	.06 /	.065
Millex, W	lb.	0.07	
Mineral Rubbers			
Black Diamond	ton	38.00 /	40.00
Hard Hydrocarbon	ton	46.50 /	48.50
Hydrocarbon MR	ton	45.00 /	55.00
Parmr	ton	21.00 /	29.00
T-MR Granulated	ton	47.50 /	50.00
Nuba No. 1, 2	lb.	.0575/	.0625
3X	lb.	.0775/	.0825
OPD-101	lb.	.26	
Rubber substitute, brown	lb.	.1835/	.2012
Car-Bel-Ex A	lb.	.14	
Car-Bel-Lite	lb.	.35	
Extender 600	lb.	.1765	
White	lb.	.148 /	.256
Stan-Shells	ton	35.00 /	73.00
Synthetic 100	lb.	.41	
Vistanex	lb.	.45 /	475

Fillers, Inert

Agrashell flour	ton	50.00 /	74.00
Barytes, floated, white	ton	41.60 /	60.10
Off-color, domestic	ton	25.00	
No. 1	ton	41.35 /	60.10
2	ton	39.35 /	58.00
Sparmite	ton	75.00 /	80.00
Blanc fixe	ton	100.00 /	165.00
Burgess Iceberg	ton	50.00 /	80.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00
HC-75	ton	12.00 /	30.00
-80	ton	14.00 /	32.00
WP #1	ton	11.00 /	16.00
Cary #200	ton	30.00 /	55.00
Citrus seed meal	lb.	.04	
Oil	lb.	.15	
Clays			
Aiken	ton	14.00	
Albacar	ton	50.00 /	55.00
Aluminum Flake	ton	20.00 /	60.00
#5	ton	23.50 /	30.00
Champion	ton	14.00	
Crown	ton	14.00 /	33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
GK Soft Clay	ton	11.00	
Hi-White R	ton	13.50	
Hydratex R	ton	28.00	
Kaolloid	ton	10.50	
Laminar	ton	30.00	
Paragon	ton	13.50 /	31.50
McNamee	ton	13.50	
RX-43	ton	33.00	
Recco	ton	14.00	
Sno-Brite	ton	12.50	
Stan-Clay	ton	28.00	
Stellar-R	ton	50.00	
Suprex	ton	14.00 /	32.00
Swanee	ton	12.50	
Windsor	ton	14.00 /	30.00

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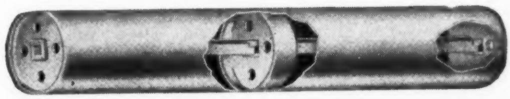

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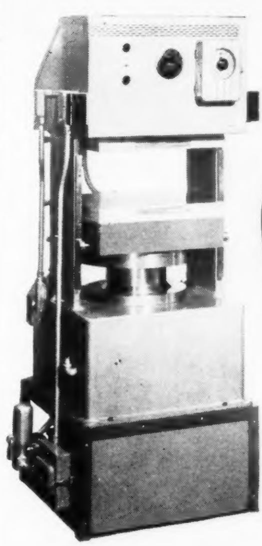

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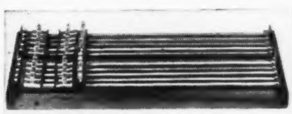

This equipment is also a must to adequately control the production of compounds intended for wire coverings, rubber belting and tire carcasses.

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SCOTT TESTERS, INC.
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Diatomaceous silica	ton	$32.00 /	$48.00
Flocks			
Cotton, dark	lb.	.095 /	.135
Dyed	lb.	.55 /	.60
White	lb.	.13 /	.33
Fabrifil X-24-G	lb.	.135	
X-24-W	lb.	.235	
Filfloc 6000	lb.	.33	
F-40-900	lb.	.135	
HSC #35 Silicone Emulsion	lb.	1.36 /	3.50
Kalite	ton	50.00 /	65.00
Lithopone, comml	lb.	.075 /	.085
Albalith	lb.	.075 /	.085
Astrolith	lb.	.06¾/	.0675
Eagle	lb.	.0725/	.075
Sunolith	lb.	.075 /	.0825
Mica Concord	lb.	.075 /	.0825
Millical	ton	35.00 /	50.00
Mineralite	ton	40.00 /	60.00
Non-Fer-Al	ton	30.00 /	45.00
Purecal	ton	56.75 /	71.75
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Sawdust	ton	14.00 /	35.00
Stan-White	ton	8.50 /	9.45
Super-White Silica	ton	23.00 /	43.00
Suspenso	ton	33.00 /	48.00
Ti-Cal	lb.	.0675	
Valron estersil	lb.	1.00	
Whiting, limestone			
Atomite	ton	30.00	
Calcite	ton	21.50	
Keystone	ton	16.00	
Omya	ton	30.00	
Paxinosa	ton	10.00 /	18.00
Snowflake	ton	17.00 /	18.00
Stonelite	ton	9.00	
Witco	ton	8.50	
York	ton	9.50	

Finishes

Apex Bright Finish #5200-E	lb.	.25	
Rubber Finish	gal.	2.50	
Black-out	gal.	4.50 /	8.00
Flocks			
Rayon, colored	lb.	.90 /	1.50
White	lb.	.75 /	1.25
Also see Flocks, under Fillers, Inert			
Rubber lacquer, clear	gal.	1.00 /	2.00
Shellacs, Angelo	lb.	.485 /	.7325
Vac Dry	lb.	.485 /	.57
Talc (*See Talc, under Dusting Agents*)			
Unidip	lb.	.15 /	.20
Wax, Bees	lb.	.64 /	.76
Carnauba	lb.	.56 /	1.03
Montan	lb.	.30 /	.32
No. 118, colors	gal.	.86 /	1.41
Neutral	gal.	.76 /	1.31
Van Wax	gal.	1.45 /	1.50

Latex Compounding Ingredients

Acintol D, DLR	lb.	.06 /	.075
FA #1	lb.	.065 /	.08
#2	lb.	.075 /	.09
Accelerator 552	lb.	2.25	
J-117, -302	lb.	1.00 /	1.15
-144	lb.	.15 /	.30
-307	lb.	1.10 /	1.25
-311	lb.	.60 /	.75
Aerosol, dry types	lb.	.39 /	1.20
Liquid types	lb.	.40 /	.72
Alcogum AN-6	lb.	.05	
AN-10	lb.	.085	
Alrosol	lb.	.41	
Alrowet D-75	lb.	.63	
Amberex solutions	lb.	.1675/	.18
Antifoam J-114	lb.	3.25 /	3.45
P-242	lb.	.24 /	.35
Antioxidant J-137, -140	lb.	.55 /	.70
-139, -293	lb.	1.45 /	1.60
-182	lb.	2.00 /	2.15
-186	lb.	1.40 /	1.55
2246	lb.	1.65 /	1.68
Anti-Webbing Agent J-183	lb.	.75 /	.90
-297	lb.	.27 /	.40
Aquablak B	lb.	.0925/	.0975
G	lb.	.105 /	.11
K	lb.	.1075/	.1125
M	lb.	.085 /	.09
Aquarex D	lb.	.78	
G	lb.	.21	
L, ME	lb.	.94	
MDL	lb.	.33	
NS	lb.	.60	
SMO	lb.	.50	
WAQ	lb.	.23	
Areskap 50	lb.	.30 /	.38
100, dry	lb.	.60 /	.72
Aresket 240	lb.	.30 /	.38
300, dry	lb.	.60 /	.72
Aresklene 375	lb.	.42 /	.57
Ben-A-Gels	lb.	.98 /	1.40
Bentone 18, 18C	lb.	.45	
34	lb.	.60	
Casein	lb.	.22	
Cellosize WP-09, -3, -300	lb.	1.36 /	1.60
CW-12	lb.	.85	
37	lb.	.70	
Defoama W-1701	lb.	.125	
Defoamer 115a	lb.	.50	
Dispersing Agents			
Blancol	lb.	.1525/	.26
N	lb.	.155 /	.26
Darvan Nos. 1, 2, 3	lb.	.22 /	.30
Daxad 11, 21, 23, 27	lb.	.08 /	.30
Dispersaid H7A	lb.	.58	
1159	lb.	.43	
Emulphor ON-870	lb.	.50 /	.70
Igepal CO-630	lb.	.2875/	.47
Igepon T-73	lb.	$0.285 /	$0.495
T-77	lb.	.45 /	.69
Indulins	lb.	.06 /	.08
Kreelons	lb.	.132 /	.155
Laurelton Oil	lb.	.18	
Leonil SA	lb.	.52 /	.65
Lomar PW	lb.	.18	
Marasperse CB	lb.	.1225/	.1425
N	lb.	.095 /	.105
Modicols	lb.	.17 /	.58
Nekal BA-75	lb.	.395 /	.54
BX-76	lb.	.63 /	.75
Pluronics	lb.	.335 /	.40
Polyfons	lb.	.08 /	.09
Sorapon SF-78	lb.	.28 /	.40
Tergitol NPX	lb.	.275 /	.3074
TMN	lb.	.2875/	.32
7	lb.	.4125/	.44
Trenamine	lb.	.15	
Triton R-100	lb.	.12 /	.25
X-100, -102, -114	lb.	.255 /	.36
Dispersions			
AgeRite Alba	lb.	3.00	
Powder, Resin D	lb.	.80	
White	lb.	1.80	
Altax	lb.	.75	
Black No. 25	lb.	.22	
Shield Nos. 2, 6	lb.	.08	
3	lb.	.095	
4-35	lb.	.09	
5	lb.	.093	
7-F, 8	lb.	.165	
55	lb.	.18	
Iron oxide, 60%	lb.	.40	
No. 305 Liquizinc	lb.	.30 /	.35
L.S.W.	lb.	1.50	
P-33	lb.	.35	
Rayox	lb.	.45	
Rotax	lb.	.75	
Sulfur	lb.	.12 /	.30
No. 2	lb.	.14 /	.16
Telloy	lb.	3.00	
Tuads, Methyl	lb.	1.60	
Vulcanizing			
C group	lb.	.40 /	1.30
G group	lb.	.45 /	.90
N group	lb.	.40 /	1.00
Zetax	lb.	.75	
Zimates, Butyl	lb.	1.30	
Ethyl, Methyl	lb.	1.35	
Zinc oxide	lb.	.40	
Emulsions			
AgeRite Stalite	lb.	.75	
Habuco Resin Nos. 502, 515, 523	lb.	.195 /	.20
503	lb.	.22 /	.225
504, 526	lb.	.19 /	.195
517	lb.	.175 /	.18
524	lb.	.155 /	.16
Resin A-2	lb.	.16 /	.25
P-370	lb.	.175 /	.25
X-210	lb.	.12 /	.22
Freeze-Stabilizer 322	lb.	.40	
12116C	lb.	.52	
Gelling Agent P-397	lb.	.34 /	.37
Igepon T-43	lb.	.145 /	.35
T-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Indulins	lb.	.06 /	.08
Ludox	lb.	.1675/	.195
Marmix	lb.	.41 /	.48
Merac	lb.	.75 /	1.05
Micronex, colloidal	lb.	.06 /	.072
Monsanto Blue 4685 WD	lb.	1.60	
Green 4884 WD	lb.	1.80	
Red 127	lb.	1.25	
OPD-101	lb.	.16 /	.26
Pliolite Latex 150, 190	lb.	.32 /	.41
170	lb.	.37 /	.46
Polyvinyl methyl ether	lb.	.25 /	.45
Resin V	lb.	.13	
Roelgel 100C	lb.	.46	
Santomerse D	lb.	.44 /	.65
S	lb.	.13 /	.25
Sellogen Gel	lb.	.1275	
Sequestrene AA	lb.	.905 /	.975
30A	lb.	.245 /	.265
ST	lb.	.585 /	.615
Setsit #5	lb.	.75 /	1.05
Stablex A	lb.	.80 /	1.10
B, G	lb.	.50 /	.95
K	lb.	.27 /	.35
P	lb.	.35 /	.50
T	lb.	.14 /	.22
Webnix	lb.	1.50 /	2.50

Mold Lubricants

Acintol D	lb.	.06 /	.075
A-C Polyethylene	lb.	.30 /	.37
Akro Gel	lb.	.165	
Alipal CO-433	lb.	.25 /	.45
CO-436	lb.	.22 /	.41
Aquarex Compounds	lb.	.21 /	.94
Carbowax 200, 300, 400	lb.	.22 /	.25
1500	lb.	.255 /	.2825
4000	lb.	.31 /	.32
6000	lb.	.35 /	.36
Colite Concentrate	gal.	.90 /	1.15
D-Tak Dip #10	gal.	1.50	
ELA	lb.	.82	
DC Mold Release Fluid	lb.	3.39 /	4.75
Emulsion Nos. 35, 35A, 35B, 36	lb.	1.36 /	2.50
DC7	lb.	5.13 /	6.50
8	lb.	1.36 /	1.80
Glycerized Liquid Lubricant, concentrated	gal.	1.48 /	1.63
Igepals	lb.	.2875/	.47
Igepon AP-78	lb.	$0.44 /	$0.68
T-43	lb.	.145 /	.35
T-51	lb.	.125 /	.285
T-73	lb.	.285 /	.495
Lubrex	lb.	.25 /	.30
Lubri-Flo	gal.	10.00 /	12.05
Lustermold	lb.	.41	
Mold Paste	lb.	.25	
Monopole Oil	lb.	.16	
Monten Wax	lb.	.57	
Para Lube	lb.	.046 /	.048
Pluronics	lb.	.335 /	.44
Polyglycol E series	lb.	.29 /	.42
Rubber-Glo	gal.	.94 /	.97
Soap, Hawkeye	lb.	1.35 /	1.45
Purity	lb.	.155 /	.165
Sodium stearate	lb.	0.40	
Stoner's 700 series	gal.	1.20 /	1.25
800 series	gal.	1.26 /	1.70
900 Series	gal.	1.55 /	2.55
A Series	gal.	1.80 /	4.50
Ucon 50-HB Series	lb.	.25 /	.375
Ulco	lb.	.12 /	.23
Vanfre	gal.	2.50 /	3.00

Odorants

Alamasks	lb.	.75 /	6.50
Coumarin	lb.	2.95 /	3.55
Curodex 19	lb.	4.75 /	5.05
188	lb.	5.75	
198	lb.	6.75	
Ethavan	lb.	6.75 /	7.35
Latex Perfume #7	lb.	4.00	
Neutroleum Gamma	lb.	3.60	
Rubber Perfume #10	lb.	2.60	
Vanillin, Monsanto	lb.	3.00 /	3.15

Plasticizers and Softeners

Acintol R	lb.	.065 /	.07
Adipol 2EH, 10A	lb.	.435 /	.465
BCA	lb.	.45 /	.475
ODY	lb.	.48 /	.51
Aro Lene #1980	lb.	.10 /	.12
Baker AA Oil	lb.	.195 /	.24
Crystal O Oil	lb.	.21 /	.255
Processed oils	lb.	.215 /	.235
Bardol, 639	lb.	.215 /	.235
B	lb.	.0625/	.065
Benzoflex 2-45	lb.	.26 /	.29
9-88	lb.	.27 /	.30
Bondogen	lb.	.55 /	.60
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125/	.021
521	lb.	.019 /	.02
BRH 2	lb.	.0213/	.0351
BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
BRV	lb.	.0475/	.0565
Bunarex Liquid	lb.	.0425/	.0555
Resins	lb.	.065 /	.1225
Bunnatol G. S.	lb.	.40 /	.505
Butac	lb.	.125 /	.135
Butyl stearate, comml	lb.	.24 /	.27
Binney & Smith	lb.	.23 /	.26
Hardesty	lb.	.23 /	.26
BxDC	lb.	.40 /	.41
Califlux 510, 550	lb.	.025 /	.0325
G. P.	lb.	.0125/	.02
R-100	lb.	.045 /	.0525
TT	lb.	.017 /	.0245
Capryl alcohol, comml	lb.	.165 /	.20
Binney & Smith	lb.	.18 /	.28
Hardesty	lb.	.18 /	.28
Chlorowax 40	lb.	.145 /	.225
70	lb.	.18 /	.24
-S	lb.	.21 /	.27
Contogums	lb.	.0875/	.111
Cumar Resins	lb.	.065 /	.17
DBM (di butyl-m-cresol)			
Darex	lb.	.32 /	.3475
DBP (di butyl phthalate), comml	lb.	.30 /	.33
Darex	lb.	.30 /	.33
Hatco	lb.	.30 /	.33
Monsanto	lb.	.30 /	.33
Naugatuck	lb.	.30 /	.33
PX-104	lb.	.30 /	.33
Rubber Corp. of America	lb.	.30 /	.44
Sherwin-Williams	lb.	.30 /	.33
DBS (di butyl sebacate), comml	lb.	.66 /	.69
Hatco	lb.	.66 /	.685
Monoplex	lb.	.66 /	.675
Naugatuck	lb.	.665 /	.69
PX-404	lb.	.665 /	.69
DCP (di capryl phthalate), comml	lb.	.295 /	.325
Hatco	lb.	.295 /	.325
Monoplex	lb.	.30 /	.315
DDA (di decyl adipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-236	lb.	.425 /	.57
DDP (di decyl phthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-266	lb.	.305 /	.455
Hatco	lb.	.305 /	.435
Defoamer X-3	lb.	.355	
DIBA (di iso butyl adipate)			
Cabflex	lb.	.4325/	.4625
Darex	lb.	.4325/	.4625
DIDA (di iso decyl adipate)			
Monsanto	lb.	.425 /	.455
DIDP (di iso decyl phthalate)			
Darex	lb.	.32 /	.35
Monsanto	lb.	.305 /	.335
PX-120	lb.	.305 /	.335

MACHINERY AND SUPPLIES FOR SALE—Continued

FOR SALE: 1—ROYLE #4 EXTRUDER, MOTOR DRIVEN; 1—Ball & Jewell rotary cutter, size 0, m.d.; 1—6" x 12" laboratory mill, m.d.; 1—Ball & Jewell #2 rotary cutter, 15-HP motor; 3—#28 Devine vacuum shelf dryers, 19-59" x 78" shelves, complete; 1—Farrel-Birmingham 20" x 22" x 60" mill, top cap frame, Falk reduction drive, 100-HP motor; 2—Farrel-Birmingham 16" x 42" mills with reduction drive and 100-HP motor; 1—Read 2,000-lb. all-steel double-ribbon horizontal mixer; 3—Colton #5½ single-punch tablet machines, m.d.; 1—Thropp 3-roll 54" Calender, m.d.; also other sizes Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters. WANTED: Your Surplus Rubber Machinery. CONSOLIDATED PRODUCTS COMPANY, INC., 64 Bloomfield St., Hoboken, N. J.; HOboken 3-4425; N. Y. Phone: BArclay 7-0600.

FOR SALE: 1—22" X 60" RUBBER MILL, MD; 1—54" 3-ROLL Vertical Calender S, MD; 1—4' x 12' Vulcanizer, Q.O. door; 1—6" x 12" 3-roll laboratory Calender MD; also Presses, Mixers, Extruders, etc. CHEMICAL & PROCESS MACHINERY CORP., 146 Grand Street, New York 13, N. Y.

Dielex B	lb.	$0.06	
Diethylene glycol, comml	lb.	.1475 /	$0.1750
Wyandotte	lb.	.15 /	.165
Dinopol IDO	lb.	.305 /	.335
DIOA (di iso octyl adipate)			
Cabflex	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-208	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DIOP (di iso octyl phthalate), comml	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.305 /	.335
PX-108	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.32 /	.34
DIOS (di iso octyl sebacate), comml	lb.	.61 /	.64
Rubber Corp. of America	lb.	.61 /	.84
DIOZ (di iso octyl azelate)			
Cabflex	lb.	.48 /	.5075
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.06 /	.0625
DNODP (di-n-octyl-n-decyl phthalate)			
Monsanto	lb.	.345 /	.375
DOA (di octyl adipate), comml	lb.	.425 /	.455
Cabflex	lb.	.425 /	.455
Good-rite GP-233	lb.	.425 /	.57
Hatco	lb.	.435 /	.465
Monsanto	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-238	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DOP (di octyl phthalate), comml	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Good-rite GP-261	lb.	.305 /	.455
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.305 /	.335
PX-138	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.32 /	.34
DOS (di octyl sebacate), comml	lb.	.61 /	.64
Hatco	lb.	.61 /	.635
Monoplex	lb.	.61 /	.635
Naugatuck	lb.	.615 /	.64
PX-438	lb.	.615 /	.64
Rubber Corp. of America	lb.	.61 /	.84
Drapex 3.2	lb.	.40 /	.45
Dutch Boy NL-A10 (DBP)	lb.	.30 /	.33
-A20 (DOP), A30 (DIOP)	lb.	.305 /	.335
-A54	lb.	.295 /	.325
-C20 (DOS)	lb.	.61 /	.63
-F21	lb.	.395 /	.425
-F31	lb.	.44 /	.47
-F41	lb.	.48 /	.51
Dutrex 6	lb.	.025 /	.035
Emulphor EL-719	lb.	.52 /	.73
Ethox	lb.	.43 /	.455
Ethylene glycol, comml	lb.	.13 /	.1575
Wyandotte	lb.	.1325 /	.1425
Flexol 3 GH	lb.	.44 /	.46
3 GO	lb.	.53 /	.55
4 GO	lb.	.325 /	.355
426	lb.	.27 /	.30
TOF, A-26	lb.	.435 /	.465
Fortex	lb.	.125 /	.145
G. B. Asphaltic Flux	gal.	.08 /	.14
Naphthenic Neutrals	gal.	.11 /	.18
Process Oil			
Light	lb.	.025 /	.0325
Medium	lb.	.035 /	.0425
Galex W-100	lb.	.155 /	.18
W-100 D	lb.	.1525 /	.1775
Gilsowax B	lb.	.09 /	.11
Harchemex	lb.	.25 /	.34
Harflex 10	lb.	1.25 /	1.335
40	lb.	.66 /	.745
50, 80	lb.	.61 /	.695
60	lb.	.62 /	.705
90	lb.	.88 /	.965
120, 150	lb.	.32 /	.35
140, 160, 180	lb.	.30 /	.33
220	lb.	.435 /	.465
260	lb.	.42 /	.45
280	lb.	.43 /	.46
500	lb.	.315 /	.345
HB-20	lb.	.15 /	.17
-40	lb.	.22 /	.24
Heavy Resin Oil	lb.	.0225 /	.0375
HSC-13	lb.	.27 /	.30
Indoil Compound 51-S	lb.	1.00 /	1.10
Indonex	gal.	.11 /	.19
Kapsol	lb.	.3225 /	.3525
Kenflex A, L	lb.	.26 /	.27
B	lb.	.23 /	.24
N	lb.	.18 /	.19
Kessoflex 103	lb.	.405	
105	lb.	.3325	
106	lb.	.38	
107	lb.	.525	
110	lb.	.24	
111	lb.	.28	
KP-23	lb.	.29 /	.32
-90	lb.	.45 /	.48
-140	lb.	.46 /	.485
-201	lb.	.5825 /	.5925
-220	lb.	.31 /	.34
-555	lb.	.45 /	.475
Kronisol	lb.	$0.33 /	$0.355
Kronitex AA, I	lb.	.33 /	.36
Marvinol plasticizers	lb.	.28 /	.8825
Methox	lb.	.385 /	.41
Monoplex S-38	lb.	.215 /	.24
S-71	lb.	.45 /	.475
Morflex	lb.	.25 /	.65
Neoprene Peptizer P.-12	lb.	1.05	
Nevillac	lb.	.39 /	.85
Neville R Resins	lb.	.13 /	.35
Nevinol	lb.	.20	
No. 1-D heavy oil	lb.	.065	
ODA (octyl decyl adipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-235	lb.	.425 /	.57
ODP (octyl decyl phthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-265	lb.	.305 /	.455
Hatco	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Ohopex R-9	lb.	.3525 /	.3775
Q-10	lb.	.295 /	.325
Orthonitro benzophenol, comml	lb.	.13 /	.15
Monsanto	lb.	.13 /	.15
Palmalene	lb.	.15	
Panaflex BN-1	lb.	.185 /	.225
Para Flux, regular	gal.	.10 /	.2125
No. 2016	gal.	.165 /	.24
2332	gal.	.11	
4205	lb.	.1075 /	.2125
Para Lube	lb.	.046 /	.048
Resins	lb.	.04 /	.045
Paradene Resins	lb.	.065 /	.075
Paraplex 5-B	lb.	.315 /	.3775
AL-111	lb.	.32 /	.3275
G-25	lb.	.79 /	.80
-40	lb.	.51 /	.52
-50	lb.	.4025 /	.4275
-53	lb.	.45 /	.475
-60	lb.	.325 /	.35
-62	lb.	.345 /	.37
RG-7	lb.	.35 /	.355
-8	lb.	.535 /	.5425
-10	lb.	.54 /	.5475
Pepton 22	lb.	.79 /	.82
Philrich 5	gal.	.11	
Picco Resins	lb.	.13 /	.185
Aromatic Plasticizers	lb.	.05 /	.065
480 Oilproof Series	lb.	.18 /	.23
Liquid Resin D-165 (Y)	lb.	.06 /	.075
(Z-3)	lb.	.07 /	.085
(Z-6)	lb.	.08 /	.095
S. O. S.	gal.	.29 /	.34
Piccocizers	lb.	.04 /	.055
Piccolastic Resins	lb.	.1855 /	.34
Piccolyte Resins	lb.	.185 /	.25
Piccopale Resins	lb.	.12 /	.135
Piccoumaron Resins	lb.	.07 /	.185
Piccovars	lb.	.145 /	.20
Piccovol	lb.	.025 /	.038
Pictar	gal.	.25 /	.30
Pigmentar	lb.	.0427 /	.0712
Pigmentaroil	lb.	.0427 /	.0712
Pine Tar, American	lb.	.0438 /	.0712
Sunny South	lb.	.0427 /	.0712
Pine Tar Oil, American	lb.	.0438 /	0712
Sunny South	lb.	.0427 /	.0712
Pitch, Burgundy			
Sunny South	lb.	.098 /	.1025
Plasticizers			
42	lb.	.34 /	.40
B	lb.	.35 /	.45
DP-520	lb.	.435 /	.455
MP	lb.	.035 /	.0755
MT-511	lb.	.535 /	.565
ODN	lb.	.32 /	.37
SC	lb.	.54 /	.63
Plastoflex #3	lb.	.52 /	.57
#520	lb.	.36 /	.435
DBE	lb.	.50 /	.55
MGB	lb.	.32 /	.40
SP-2	lb.	.43 /	.48
VS	lb.	.40 /	.475
Plastogen	lb.	.0775 /	.08
Plastone	lb.	.22 /	.3075
Polycizers	lb.	.40 /	.47
PT67 Light Pine Oil	gal.	.60	
101 Pine Tar Oil	lb.	.0427 /	.0601
Pine Tars	lb.	.0427 /	.0601
R-19, R-21 Resins	lb.	.1075	
Reogen	lb.	.1325 /	.135
Resin C pitch	lb.	.0225 /	.031
R6-3	lb.	.38 /	.40
Resinex 10, 25, 50, 110	lb.	.04 /	.045
70	lb.	.0325 /	.0375
85, 100	lb.	.035 /	.04
115	lb.	.0375 /	.0425
L-2, L-3, L-4, L-5	lb.	.0225 /	.03
Rosin Oil, Sunny South	gal.	.58 /	.875
RPA No. 2	lb.	.78	
3	lb.	.47	
Conc	lb.	.97	
5	lb.	.59	
RSN Flux	gal.	.10 /	.19
Rubber Oil B-5	lb.	.0225 /	.0355
Rubberol	lb.	.2575 /	.2725
Santicizer 1-H	lb.	.50 /	.51
3	lb.	.46 /	.47
8	lb.	.43 /	.44
9	lb.	.39 /	.42
140	lb.	.33 /	.36
141	lb.	.34 /	.37
160	lb.	.25 /	.28
601	lb.	.325	
602	lb.	.305	
B-16	lb.	.4875 /	.4975
E-15	lb.	.5075 /	.5375
M-17	lb.	.4275 /	.4575
Sebacic acid, purified, comml	lb.	$0.64 /	$0.70
Binney & Smith	lb.	.64 /	.76
Hardesty	lb.	.64 /	.76
C.P.-Binney & Smith	lb.	.72 /	.84
Hardesty	lb.	.72 /	.84
Sherolatum Petrolatum	lb.	.05 /	.10
Softener #20	gal.	.10 /	.20
Special Rubber Resin 100	lb.	.1675 /	.2175
Staflex AX	lb.	.43	
DBES	lb.	.61 /	.635
Syn-Tac	gal.	.33 /	.35
Synthol	lb.	.2475	
Thiokol TP-90B	lb.	.59	
-95	lb.	.65	
Tricresyl phosphate, comml	lb.	.33 /	.36
Cabflex	lb.	.33 /	.36
Monsanto	lb.	.33 /	.36
Naugatuck	lb.	.33 /	.36
PX-917	lb.	.33 /	.36
Triphenyl phosphate, comml	lb.	.39 /	.40
Monsanto	lb.	.39 /	.40
Turgum S	lb.	.1075 /	.1175
Tysonite	lb.	.24 /	.2475
United	gal.	.69 /	1.20
X-1 Resinous Oil	lb.	.021 /	.0275

Reclaiming Oils

Acintol C, P	lb.	.02 /	.03
Bardol, 639	lb.	.0275 /	.0375
B	lb.	.0625 /	.065
BRH 2	lb.	.0213 /	.0351
BRT 3	lb.	.018 /	.0265
4	lb.	.025 /	.026
7	lb.	.03 /	.031
BRV	lb.	.0475 /	.0565
Burco-RA	lb.	.053 /	.0805
BWH-1	lb.	.16 /	.18
Dipolymer Oil	gal.	.33 /	.43
Dispersing Oil No. 10	lb.	.06 /	.0625
G. B. Oils	gal.	.10 /	.24
Heavy Resin Oil	lb.	.0225 /	.0375
LX-777	gal.	.23 /	.33
No. 3186	gal.	.28 /	.295
Picco 6535	gal.	.25 /	.30
C-33	gal.	.215 /	.315
-42	gal.	.23 /	.33
D-4	gal.	.27 /	.37
E-5	gal.	.25 /	.35
Q-Oil	gal.	.286 /	.36
PT 67	gal.	.60	
101 Pine Tar Oil	lb.	.0427 /	.0610
150 Pine Solvent	gal.	.44	
Reclaiming Oil #3186	gal.	.28 /	.385
-G	gal.	.25 /	.365
4039-M	gal.	.3275 /	.3975
-Y	gal.	.30 /	.37
RR-10	lb.	.36	
S. R. O	lb.	.015 /	.0225
X-1 Resinous Oil	lb.	.021 /	.03

Reinforcers, Other Than Carbon Black

American Resinous Chemical			
978-42B	lb.	.18 /	.19
1073-18B	lb.	.135 /	.145
1294-36B	lb.	.115 /	.125
1301-12B	lb.	.15 /	.16
Angelo Shellacs	lb.	.485 /	.7325
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125 /	.021
521	lb.	.019 /	.02
Bunarex Resins	lb.	.065 /	.1225
Cab-o-sil	lb.	.68 /	.75
Calcene NC	ton	72.50 /	92.50
TM	ton	75.00 /	95.00
Calco S. A.	lb.	.85 /	.88
Clays			
Aiken	ton	14.00	
Buca	ton	45.00	
Burgess HC-75	ton	12.00 /	30.00
HC-80	ton	14.00 /	32.00
Iceberg	ton	50.00 /	60.00
Pigment No. 20	ton	35.00 /	60.00
30	ton	37.00 /	60.00
Catalpo	ton	35.00	
Crown	ton	14.00 /	33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
L. G. B.	ton	17.00	
Paragon	ton	13.50 /	33.00
Pigment No. 33	ton	37.00	
Recco	ton	14.00	
Suprex	ton	14.00 /	33.50
Swanee	ton	12.50	
Whitetex	ton	50.00	
Windsor	ton	14.00 /	30.00
Witco No. 1	ton	14.00 /	30.00
No. 2	ton	13.50 /	30.00
Clearcarb	lb.	.1175 /	.1255
Cumar Resins	lb.	.065 /	.17
Darex Resins	lb.	.42 /	.49
Diatomaceous silica	ton	32.00 /	48.00
Good-rite Resin 50	lb.	.39 /	.41
K Series Polymers	lb.	.15 /	.37
Hi-Sil 101	lb.	.10 /	.115
233	lb.	.09 /	.105
X303	lb.	.40 /	.45
Indulins	lb.	.06 /	.08
Kralac A-EP	lb.	.43 /	.54
Laminar	ton	30.00	
Magnesium Carbonate, Merck	lb.	.105 /	.12
Marbon Resins	lb.	.39 /	.46
Multifex	ton	140.00 /	155.00
MM	ton	110.00 /	125.00
Super	ton	160.00 /	175.00

MACHINERY AND SUPPLIES FOR SALE—Continued

FOR SALE: MOLDS, ALUMINUM. QUANTITY, 1,000. FOR dipping children's rubber footwear. Assorted sizes. Write Box No. 1752, care of RUBBER WORLD.

MACHINERY & SUPPLIES WANTED

WANTED: PLANT OR MACHINERY INCL. RUBBER MILLS, Calenders, Mixers, Banbury Mixers, Extruders, Grinders, Cutters, Hydraulic Presses, Injection Molding Machines. CONSOLIDATED PRODUCTS CO., INC., 64 Bloomfield Street, Hoboken, N. J. BArclay 7-0600.

WANTED: 3-ROLL CALENDER WITH 40" OR LONGER rolls. 40—42" Mill. #9 Banbury. Address Box No. 1750, care of RUBBER WORLD.

BUSINESS OPPORTUNITIES

BRITISH RUBBER MANUFACTURERS OF MECHANICAL rubbers, sponge, etc., would be interested to hear of new lines, preferably patented, which can be manufactured and sold in England under royalty or other satisfactory basis. Please write to Sales Manager, Dermatine Co., Ltd., Camberwell, London, S.E. 5, England.

Neville Resins			
465	lb.	$0.07	$0.0825
G	lb.	.13	
LX-509	lb.	.35	
Nebony	lb.	.04	.0575
Paradene	lb.	.065	.075
R	lb.	.13	.18
Para Resins 2457, 2718	lb.	.04	.45
Parapol S-Polymers	lb.	.44	
Picco Resins	lb.	.13	.185
Piccolyte Resins	lb.	.205	.275
Piccoumaron Resins	lb.	.07	.19
Piccovars	lb.	.145	.20
Pliolite NR types	lb.	.98	1.33
S-3, -6	lb.	.42	.49
-6B	lb.	.39	.46
Purecal M	ton	56.75	71.75
SC, T	ton	110.00	125.00
U	ton	120.00	135.00
R-B-H 510	lb.	.15	.22
Resinex	lb.	.0325	.0425
Rubber Resin LM-4	lb.	.28	.35
Silene EF	ton	120.00	140.00
Silvacons	ton	55.00	85.00
Witcarb R	ton	105.00	120.00
-12	ton	45.00	66.00
Zeolex 23	ton	120.00	140.00
Zinc oxide, commercial†	lb.	.135	.1775

Retarders

Benzoic acid TBAO-2	lb.	.44	
E-S-E-N	lb.	.35	.37
Good-rite Vultrol	lb.	.62	.66
R-17 Resin	lb.	.1075	.36
Retarder ASA	lb.	.57	
J	lb.	.62	.64
PD	lb.	.35	.37
W	lb.	.45	
Retardex	lb.	.47	.50
Thionex	lb.	1.14	

Solvents

Bondogen	lb.	.55	.60
Butyrolactone	lb.	.60	.65
Cosol #1	gal.	.37	.43
#2	gal.	.42	.48
Dichloro Pentanes	lb.	.04	.07
Dipentene DD	lb.	.265	.57
Ethylene dichloride, comml.	lb.	.09	.1225
Hi-Flash 2-50-W	gal.	.41	
Pale yellow	gal.	.39	
LX-572	gal.	.27	.32
-748	gal.	.16	.23
n-Methyl-2-pyrrolidone	lb.	.75	.80
Neville Nos. 100, 104	gal.	.52	.60
106	gal.	.38	.46
Nevsol B	gal.	.20	.30
H, 200	gal.	.19	.29
HF, T, 30	gal.	.24	.34
Penetrell	gal.	.265	.57
Picco Hi-Solv Solvents	gal.	.16	.48
Pine Oil DD	lb.	.1125	.1355
PT 150 Pine Solvent	gal.	.44	
Skellysolve-E	gal.	.153	
-H	gal.	.133	
-R, -V	gal.	.109	
-S	gal.	.099	
Stauffer Carbon Disulphide	lb.	.0525	.085
Tetrachloride	lb.	.0825	.475

Synthetic Rubbers and Latices

PRIVATELY PRODUCED

ASRC-1500, -1502	lb.	.241	
Butaprene Latex (dry wt.)			
NL types	lb.	.47	.52
NXM types	lb.	.55	60
Butaprene NAA	lb.	.54	.55
NF	lb.	.49	.50
NL	lb.	.50	.51
NXM	lb.	.58	.59
Butaprene S-1000, -1001, -1004, -1006, -1500, -1502	lb.	.23	
-1002, -1005, -1009	lb.	.2455	
-1010	lb.	.245	
-1012, -1013	lb.	.243	
-1014	lb.	.248	
-1015	lb.	.28	
-1703	lb.	.195	
-1705	lb.	.1925	
-1710, -1712	lb.	.1775	
Butaprene S Latex Type 2000, 2001, 2006	lb.	.26	
2002	lb.	.285	
2003, 2004	lb.	.295	
2105	lb.	.31	
Chemigum 30N4NS, 50N4NS	lb.	.50	.52
N1NS	lb.	.64	.66
N3NS	lb.	.58	.60
N6, N7	lb.	.50	.52
Chemigum Latex (dry wt.)			
101 types	lb.	.35	.42
200, 245 types	lb.	.47	.55
235 types	lb.	.55	.63
Copo 1500, 1502	lb.	.241	.25
1505	lb.	.261	.27
1712	lb.	.1885	.1975
2101	lb.	.28	.345
2102, 2105	lb.	.31	.375
X-765	lb.	.29	.355
Enjay Butyl 035 (GR-I-35), 150 (GR-I-50), 215 (GR-I-15), 217 (GR-I-17), 218 (GR-I-18), 325 (GR-I-25)	lb.	.23	.26
G-G 1001, 1006, 1500, 1501, 1502	lb.	.241	.247
1002	lb.	.2435	.2495
1703	lb.	$0.206	$0.212
1705, 1706	lb.	.2035	.2095
1707	lb.	.191	.197
1709, 1710, 1711, 1712	lb.	.1885	.1945
GR-S Type 1000, 1001, 1006, 1007, 1012, 1500	lb.	.2425	.255
1002	lb.	.245	.2575
1009	lb.	.2475	.26
1013	lb.	.25	.2625
1703	lb.	.2075	.22
1707	lb.	.1925	.205
1711	lb.	.19	.2025
Hycar 1001, 1041	lb.	.53	.59
1002, 1042, 1043	lb.	.50	.51
1014, 1312	lb.	.60	.61
1411	lb.	.62	.63
1432	lb.	.59	.60
1441	lb.	.64	.65
2202	lb.	.65	.75
Hycar Latex (dry wt.)			
1512, 1552, 1562, 1577	lb.	.46	.52
1551, 1561	lb.	.54	.60
1571	lb.	.59	.65
1572	lb.	.51	.57
Hypalon	lb.	.95	1.01
Indulin-70-GR-S	lb.	.22	.23
Naugapol 1016, 1019, 1503	lb.	.255	.26
1018, 1022	lb.	.26	.265
1021	lb.	.29	.295
1023, 1504	lb.	.265	.27
Neoprene Latex (dry wt.)			
Type 571, 842-A	lb.	.37	.48
572	lb.	.39	.50
601-A	lb.	.40	.51
735, 736	lb.	.38	.49
950	lb.	.47	.58
Neoprene Type AC, CG	lb.	.55	.58
GN, GN-A	lb.	.41	.44
GRT, S	lb.	.42	.45
KNR	lb.	.75	.78
Q	lb.	1.00	1.03
W, WHV	lb.	.39	
WRT	lb.	.45	.48
Paracril 18-80	lb.	.60	.61
AJ	lb.	.485	.495
B, BJ	lb.	.50	.51
BV	lb.	.51	.52
C	lb.	.58	.59
CS, CV	lb.	.59	.60
Paraplex X-100	lb.	1.00	
Philprene 1000, 1001, 1006	lb.	.25	
1009	lb.	.255	
1018	lb.	.2575	
1019	lb.	.2525	
1100	lb.	.199	
1500, 1502	lb.	.25	
1503	lb.	.2525	
1600, 1601, 1602	lb.	.20	
1605	lb.	.194	
1703	lb.	.212	
1706	lb.	.21	
1708	lb.	.197	
1711, 1712	lb.	.194	
1803	lb.	.18	
Plioflex 1000, 1006, 1502	lb.	.2425	.255
1703	lb.	.2075	.22
1710	lb.	.19	.2025
Pliolite Latex (dry wt.)			
2101	lb.	.2775	.2975
2104, 2105	lb.	.28	.30
X765	lb.	.265	.285
S-1000, -1001, -1006, -1500, -1501, -1502	lb.	.23	
-1100, -1600, -1602, -1703	lb.	.185	
-1706	lb.	.1925	
-1707	lb.	.18	
-1709, -1712	lb.	.1775	
-1801	lb.	.17	
-2000	lb.	.2275	
-2004	lb.	.26	
-2101	lb.	.225	
Silastic	lb.	2.30	4.05

§Listed below are the new GR-S type synthetic rubbers and latices trade names and the chief sales offices of their producers or distributors.

ASRC —American Synthetic Rubber Corp., 370 Lexington Ave., New York 17, N. Y.

Butaprene S[2] —Firestone Tire & Rubber Co., Synthetic Rubber Division, 381 Wilbeth Rd., Akron 1, O.

Copo[2] —Copolymer Rubber & Chemical Corp., P. O. Box 1029, Baton Rouge 1, La.

G-G —Goodrich-Gulf Chemicals, Inc., 2060 E. Ninth St., Cleveland 15, O.

GR-S Type[1] —Texas-U. S. Chemical Co., Port Neches, Tex. (producer); Naugatuck Chemical Division (distributor).

Naugapol[2] —Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.

Philprene —Phillips Chemical Co., Rubber Chemicals Division, 318 Water St., Akron 8, O.

Plioflex —Goodyear Synthetic Rubber Corp., 1144 Market St., Akron 16, O.

Pliolite Latex—Goodyear Synthetic Rubber Corp. Also distributed by General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass.,

S- —Shell Chemical Corp., Synthetic Rubber Sales Division, 30 W. 50th St., New York 20, N. Y.

[1]Trade name still undetermined.
[2]Rubber and latices.

Thiokol LP-2, -3, -32, -33	lb.	0.96	
-8, -38	lb.	1.25	
PR-1	lb.	.95	
Type A	lb.	.47	
FA	lb.	.69	
ST	lb.	1.00	
Thiokol Latex (dry wt.)			
Type MF	lb.	.85	
MX	lb.	.70	
WD-2	lb.	.92	
-5	lb.	.95	
-6, -7	lb.	.70	
Vistanex types	lb.	.45	

GOVERNMENT

Cold GR-S Black Masterbatches

Staining			
1600, 1601, 1602	lb.	.185	

Cold GR-S Oil Black Masterbatches

Staining			
1801	lb.	.17	

Synthetic Rubber Shortstops

DDM	lb.	.85	$0.88
Thiostop K	lb.	.53	
N	lb.	.41	

Tackifiers

American Resinous Chemical			
A25, A26, 716-30	lb.	.18	.19
555-40R	lb.	.185	.205
620-32B	lb.	.20	.21
716-35	lb.	.17	.18
1041-21	lb.	.165	.175
Acintol R	lb.	.065	.07
Bardol, 639	lb.	.0275	.0375
BRH 2	lb.	.0213	.0351
Bunarex Resins	lb.	.065	.1225
Chlorowax 70	lb.	.18	.24
Contogums	lb.	.0875	.11
Cumar Resins	lb.	.065	.17
Galex W-100	lb.	.155	.17
W-100D	lb.	.1525	.1625
Indopol H-35	gal.	.65	.81
H-50	gal.	.70	.86
H-100	gal.	.85	1.05
H-300	gal.	1.00	1.21
L-10	gal.	.40	.56
L-50	gal.	.45	.61
L-100	gal.	.55	.71
Kenflex resins	lb.	.18	.27
Koresin	lb.	.90	1.10
Natac	lb.	.12	.13
Nevindene	lb.	.15	.18
Picco Resins	lb.	.13	.185
Piccolastic Resins	lb.	.1855	.34
Piccolyte Resins	lb.	.185	.25
Piccopale Resins	lb.	.95	.16
Piccoumaron Resins	lb.	.07	.185
R-B-H 510	lb.	.15	.22
Roelflex 1118A	lb.	.39	
Synthetic 100	lb.	.41	
Synthol	lb.	.2475	.2625
United	gal.	.69	1.20

Vulcanizing Agents

Dibenzo G-M-F	lb.	2.60	
G-M-F #113, #117	lb.	.90	
Ko-Blend I, S	lb.	.39	
Litharge (*See Accelerator-Activators, Inorganic*)			
Magnesium oxide	lb.	.2525	.38
Merck, Light Calcined	lb.	.2525	.26
Extra Light Calcined	lb.	.2925	.30
Red lead (*See Accelerator-Activators, Inorganic*)			
Sufsal R	lb.	1.50	
Sulfur flour, comml.	100 lbs.	2.30	3.05
Aero	100 lbs.	2.15	7.50
Crystex	lb.	.195	.23
Insoluble 60	lb.	.125	.13
Rubbermakers	100 lbs.	2.40	4.30
Stauffer	lb.	.024	.0515
Telloy	lb.	2.50	
VA-7	lb.	.50	.60
Vandex	lb.	6.00	
Vultac No. 2	lb.	.47	.755
3	lb.	.51	.795
White lead silicate (*See Accelerator-Activators, Inorganic*)			

Replaceable Sidewalls

Colored replaceable rubber sidewalls for tires have been introduced by The Goodyear Tire & Rubber Co., Akron, O. Dubbed Fiesta Wall, the molded rubber rings are said to be installed easily without special tools or adhesive and to fit firmly between tire bead and wheel rim. Red, yellow, blue green, and pink are the colors available, as well as white. The sidewalls are packaged in sets of four in a single color.

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